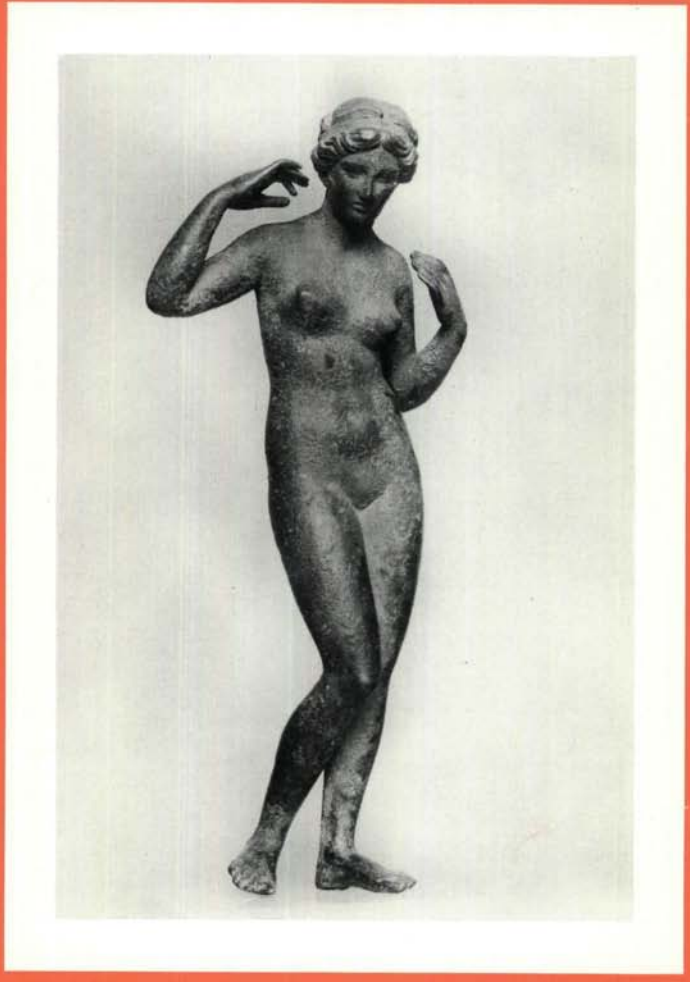
THE MANKIND QUARTERLY



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Cover Picture: Bronze statuette of Aphrodite: Greece, Third Century B.C. (See article: *Ancient Eugenics*)

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The Ash Tree in Indo-European Culture

Darl J. Dumont
University of California

Many species of *Fraxinus,* the ash tree, exude a sugary substance which the ancient Greeks called μέλι, i.e. honey. This substance was harvested commercially until the early part of this century, and is found on *Fraxinus excelsior* in northern Europe and *Fraxinus ornus* in the mountains of Greece.

This fact sheds light on certain themes in classical literature – the idea of a golden age when men ate acorns and honey that dripped from trees, the idea that bees collect honey from the leaves and branches of trees, and that ash tree nymphs were nurses of the infant Zeus in the Cretan cave of Dicte. (They fed him honey). Also, a new etymology of the Greek word for ash tree is proposed in light of these connections.

In Norse mythology certain details of the description of Yggdrasil, the world ash, also can be explained by the sugary property of ash trees. It is felt to rain honey on the world, and mead is said to flow in its branches.

Again in Sanskrit literature certain beliefs are found which parallel the Greek and Norse ideas, for instance that honey rains down upon the world from the skies. Certain things that are said about the divine intoxicant *soma* seem to indicate a connection to ash trees, or rather a confused memory of ash trees, since they do not grow in India except in the Himalayas.

In light of these parallels in the Indo-European literatures, it seems very probable that sugar from ash trees played an important role in Indo-European mythology and ritual. A surviving Finno-Ugrian ritual, observed in 1911, connects honey, tree resins, and tree worship in a way which must be similar to ancient Indo-European ritual.

Ash Tree in Indo-European Culture[†]

The importance of the ash tree in Germanic Mythology is clear. The world ash, Yggdrasil, is central to the structure of the cosmos. The first man, Ask, ("Ash"), was formed from an ash tree

[†] I would like to thank Richard Janko of UCLA, Apostolos N. Athanassakis, D. Barton Johnson, Borimir Jordan, and Robert Renehan of UCSB, and Egbert J. Bakker of the University of Leiden for valuable suggestions and comments.

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found on the beach by Oðin and his brothers, the sons of Bor.[1]

After Ragnarok, the race of mankind will be restored from a man and woman who are somehow sheltered within the world ash and nourished on dew.[2] But some scholars are not sure why the ash tree should have this importance. Ellis-Davidson among others has suggested that the world ash may really have been an oak.[3]

In Greek Mythology also, ash trees have a prominence that has puzzled some scholars. Hesychius in his lexicon contains this entry: μελίας καρπός· τὸἀνθρώπων γένος. ("Seed of ash: the race of men"), and this idea is found elsewhere in the literature.[4] At the time when Ouranos was overthrown by Kronos, the Giants, the Furies, and the nymphs called Μελίαι were formed. (Hesiod, *Theogony* 187). The word μελίαι means ash trees, but West in his commentary says "they are tree nymphs, probably without distinction of the particular kind of tree".[5] At the next change of régime among the gods, the Μελίαι were present again, in the cave of Dikte on Crete serving as nurses of the infant Zeus.[6] A. B. Cook wrote an article interpreting the Μελίαι as honey nymphs or bee nymphs, never mentioning their standard interpretation as ash tree nymphs at all.[7]

But ash trees have a property apparently not so well known to philologists which may explain their prominence: They secrete a sugary substance from their bark and leaves, which until the early part of this century was harvested and sold under the name "manna".[8] In the nineteenth century this product was important as a pharmaceutical, and early editions of *The Dispensatory of the United States of America* devote substantial space to it.

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[1] J. I. Young, trans., *The Prose Edda of Snorri Sturluson* (University of California Press, 1954), p. 37.

[2] *Vafthrunismál* 45; J. I. Young, trans., *Prose Edda* p. 92; H. R. Ellis Davidson, *Gods and Myths of Northern Europe* (Penguin, 1964) p. 38.

[3] H. R. Ellis Davidson, *Gods and Myths of Northern Europe*, p. 191.

[4] Palaephaetus 35; sch. *Theogony* 187; sch.^{T} *Iliad* 22.126; According to Hesiod at *Opera et Dies* 145, the men of the bronze age were made of ash.

[5] M. L. West, *Hesiod: Theogony* (Oxford, 1966), p. 221.

[6] Callimachus, *Hymnus in Jovem* 47. Other versions of this story will be discussed below.

[7] A. B. Cook, "The bee in Greek mythology", JHS 15 (1895), pp. 1-24.

[8] Botanical works do not usually mention the exudations of plants in their morphological descriptions. However, gardeners are well aware of this property – a friend of mine who is a horticulturist in Southern California says he never parks his cars under ash trees in hot weather.

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> MANNA... a concrete saccharine exudation of *Fraxinus ornus* and of *Fraxinus rotundifolia*... Besides the two species of *Fraxinus* indicated by the Pharmacopoeias, it is said to be obtained from several other trees belonging to the genera *Ornus*[9] and *Fraxinus* among which *F. excelsior* and *F. parvaflora* have been particularly designated...It exudes spontaneously or by incisions during the hottest and driest weather in July and August...It is owing to the presence of true sugar and dextrin that manna is capable of fermenting...Manna, when long kept, acquires a deeper color, softens, and ultimately deliquesces into a liquid which on the addition of yeast, undergoes the vinous fermentation.[10]

The *Flora Europaea* lists four species of *Fraxinus* native to Europe including *F. ornus* and *F. excelsior*, which are explicitly named above as producing manna.[11] *F. excelsior* is the only species which grows in northern Europe, and must have been the model for the world ash Yggdrasil. It grows only as far south as what the ancients called Macedonia.[12] However *F. ornus* is widespread in Greece, and the two remaining European species of ash are found there also.[13]

LSJ defines μελία as "manna ash, *Fraxinus ornus*".[14] Directly

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[9] Modern botanical practice is to rejoin *Ornus* and *Fraxinus* into a single genus *Fraxinus*. *Ornus europaea* is a synonym of *Fraxinus ornus*.

[10] G. Wood and E. Bache, *The Dispensatory of the United States of America*, 14th edition (Philadelphia: Lippincott, 1878), pp. 572-575. The substance was used as a mild laxative. Bees' honey is also a mild laxative, see *Encyclopedia Britannica*, 11th edition, s.v. "honey". Modern editions of the *Dispensatory* simply discuss ash tree manna's active component "mannitol" without mention of ash trees.

[11] Tutin, Heywood, et. al., *Flora Europaea* (Cambridge University Press, 1972), pp. 53-54.

[12] E. Huldén, "Studien über *Fraxinus excelsior* L.", in *Acta Botanica Fennica 28* (Helsinki, 1941), map p. 230.

[13] O. Polunin, *Flowers of Greece and the Balkans: a Field Guide* (Oxford University Press, 1978), pp. 363-364.

[14] Since Jones' revision in 1925, LSJ has defined μελία as signifying only a single species *Fraxinus ornus*, the manna ash. βουμελία is defined as *Fraxinus excelsior*. This is in keeping with the general practice of the revised dictionary to provide exactly one scientific name for every Greek common name. This practice is incorrect; in this case it leaves two other species of ash in Greece for which LSJ provides no Greek words. Before Jones, the definition in Liddell and Scott was merely "ash, *Fraxinus*", which from Theophrastus' description of the compound leaves and other characteristics of the plant is clearly correct. Theophrastus describes βουμέλιος = βουμελία as a kind of μελία, not as a different kind of tree. He comments that some men, like those in Macedonia, distinguish βουμελία from μελία, but this would seem to imply that he does not do so himself. The entry for "ash" in the eleventh edition of the *Encyclopedia Britannica*

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above lies the entry for μέλι, "honey". LSJ's third definition for μέλι is "sweet gum collected from certain trees, manna". In light of this juxtaposition it seems odd that none of the standard etymological dictionaries consider, even to dismiss in passing, that μελία may be derived from μέλι, making the ash tree a honey tree.[15]

"Ét. peu clair" says Chantraine.[16] Frisk comments "Morphologisch und etymologisch isoliert."[17] The common Indo-European word for ash, *os- (from which our English word "ash" descends) was transferred to the beech tree (ὀξύη) by the Greeks at some point in their migrations.[18]

Both Frisk and Chantraine cite without enthusiasm an ancestral form originally proposed by Schulze in 1892: *σμελϜία.-[19] Prellwitz in 1905 compared *σμελϜία with the word *smëlùs* which is found in a dialect of Lithuanian. It means "brownish" or "grayish".[20] Page in 1959 commented that in Homer, μελίη lengthens a preceding short vowel in 11 of 13 places, which he felt to be the memory of the lost sigma.[21] The compound ἐϋμμελίης "having a good ash spear", with its geminated -μμ- must also be cited in support of this idea.

However, Chantraine in his Homeric grammar discusses many cases where an initial sonant (λ and ν as well as μ) geminates or lengthens a preceding short vowel, including words which surely

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mentions seven genera as being "ash trees", and within the single genus *Fraxinus*, seven species are named. Common names are of an entirely different nature from scientific names, and the ancient Greeks should be allowed the same luxury of imprecision which is found in modern lanugages.

[15] However P. J. Murr proposed this derivation in 1890 in *Die Pflanzenwelt in der Griechischen Mythologie* (Groningen, Verlag Bouma's Boekhuis, reprinted 1969) p. 30.

[16] P. Chantraine, *Dict. Étym.*, s.v μελία.

[17] H. Frisk, *GEW*, p. 203, s. v. μελία..

[18] Friedrich, *Proto-Indo-European Trees* (University of Chicago Press, 1970), p. 96. In fact ὀξύα / ὀξύη means both "beech tree" and "spear", just like μελία / μελίη and *askr* mean both "ash tree" and "spear". Friedrich comments: "The ash cognates illustrate well the relation between the name of a tree and the products manufactured from its wood".

[19] W. Schulze, *Quaestiones Epicae* (1892, reprinted by George Olms, Hildesheim, 1967), p. 118.

[20] W. Prellwitz, *Etymologisches Wörterbuch der Griechischen Sprache*, (Göttingen: Vandenhoeck und Ruprecht, 1905).

[21] D. L. Page, *History and the Homeric Iliad* (Univ. of California Press, 1959), p. 240.

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never had an initial sigma.[22] Also the suffix *-ία* is very common among Greek plant names and these names are almost always derivative from another Greek word.[23]

But whether or not ash trees and honey are related etymologically, the connection in mythology is definite. first it should be noted that classical writers used a single word to describe three different substances: honey made by bees, honeydew (which we now know is produced by aphids and scale insects), and manna secreted by trees, and that these substances were not necessarily felt to be different in nature. Both the Greeks and the Romans felt that bees' honey resulted from the bees' collection of the other two substances. The belief that honey first falls from the skies, and is then collected by bees, not only from flowers, but also from tree leaves, fields, etc. is well attested. Aristotle says:

> The honey is what falls from the air, especially at the risings of the stars and when the rainbow descends. On the whole there is no honey before the [morning] rising of the Pleiad... Honey [the bee] does not make, it fetches what falls.[24]

Pliny the elder speculates as to the source of this dew:

> Honey comes out of the air, and is chiefly formed at the risings of the stars, and especially when the dogstar itself shines forth, and not at all before the risings of the Pleiades, in the periods just before dawn. Consequently at that season at early dawn the leaves of trees are found bedewed with honey and any persons who have been out under the morning sky feel their clothes smeared with damp and their hair stuck together, whether this is the perspiration of the sky, or a sort of saliva of the stars, or the moisture of the air purging itself... Falling from so great a height, and acquiring a great deal of dirt as it comes, and becoming stained with the vapor of the earth that it encounters, and moreover having been sipped from foliage and pastures and having been collected in the stomachs of bees –

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[22] P. Chantraine, *Grammaire Homérique*, (Paris: Klincksieck, 1958), vol. 1, p. 176.

[23] A. Carnoy, *Dictionnaire Étymologique des Noms Grecs des Plantes* (Louvain: Publications Universitaires, 1959). This work contains many examples with etymologies, for example: *ἀντικυρία* "hellebore" from *ἀντι* + *κύριος* "withstanding force", *κερανία* "sempervirum" from *κέρανος* "thunderbolt", *κερατωνία* "carob tree" from *κερατῶν* "made of horn", *κοκκέγία* "wig tree" from *κόκκυξ* "cuckoo".

[24] Aristotle, *Historia Animalium* 5.22, trans. A. L. Peck (Harvard University Press [Loeb], 1970), vol. 2, p. 191.

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> for they throw it up out of their mouths, and in addition being tainted by the juice of flowers, and soaked in the corruptions of the belly and so often transformed, nevertheless it brings with it the great pleasure of its heavenly nature.[25]

These ancient beliefs, although they have been treated condescendingly by classicists, are neither as untrue nor improbable as one might think at first. A modern scholarly work on honey contains the following:

> Honeydew and manna are collected by bees; in some coniferous forests honeydew may provide the main honey flow, and a very prolific one... Honey produced from honeydew is explicitly included in the definition for honey in many countries...[26]

The ancients felt that honeydew spontaneously precipitated from the atmosphere. We ourselves have no trouble believing the same thing about normal dews of water, so it was not unreasonable for the ancients to feel that honeydew was similar in nature. Honeydew was associated with the same seasons as water dews.[27] The truth about honeydew, that it is the excrement of aphids and scale insects, would have seemed astonishing and bizarre. This is from a modern work on bee-keeping:

> Honeydew... is often so abundant on the leaves of trees and bushes that it drops upon the grass and sidewalks, covering them with a glistening coating resembling varnish. At times it falls in minute globules like rain... The dew is forcibly ejected or flipped from the end of the abdomen, and when there are many aphids it falls in a spray of minute globules. If the dew were not thrown a little distance from their bodies they would soon be glued together... When freshly gathered it may be clear, sweet, and agreeable in

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[25] Pliny, *Natural History* 9.30, trans. H. Rackham (Harvard University Press [Loeb], 1940), vol. 2, p. 450.

[26] E. Crane, ed., *Honey: A Comprehensive Survey* (New York: Crane, Russak, and Co., 1975), p. 21.

[27] See the biblical version at Numbers 11:9. Discussions of the biblical manna may be found in R. Brown et al., *The Jerome Biblical Commentary*, vol. 1, pp. 55, 90. and B. Anderson, *Understanding the Old Testament* (Englewood Cliffs: Prentice-Hall, 1975) pp. 76-77. It was excreted by scale insects on Tamarisk trees. Bedouins still rely on this food source today.

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flavor... The better grades find a sale to bakers.[28]

There is no evidence in the literature that in historical times the Greeks or Romans themselves depended on honeydew or manna as a source of nutrition.[29] Beekeeping requires a settled way of life, but once beekeeping is adopted, there is a large and reliable source of honey, and the incentive to forage for the seasonal wild sugars is reduced. The Greeks and Romans were avid beekeepers – Solon made an ordinance that no man might put a beehive within three hundred feet of his neighbor's (Plutarch, *Solon* 23. 6).

But the Greeks did note the consumption of manna and honeydew by their barbarian neighbors – and they called these substances μέλι, or honey. Aelian mentions honey from box trees in Pontus and reports of honey from plants in Thrace. He claims that there are rains of honey in the spring in India (*De natura animalium* 5.42, 15.7). Diodorus Siculus says that the Nabateans ate "plenty of so-called honey from trees" (*Bibliotheca Historica* 19.94), probably the Biblical tamarisk manna. Herodotus mentions the town of Callatebus in Lydia, "where craftsmen make honey from wheat and tamarisks" (*Historiae* 7.31). Polyaenus describes the Persian king's daily requisition of food, inscribed on a brass column. It includes 100 cakes of "raining honey" (ὕοντος μέλιτος), weighing around ten minae (*Strategemata* 4.3.32). Strabo tells of some extremely barbaric peoples on the eastern side of Pontus who put bowls of "crazing honey" (μαινομένου μέλιτος) in the road, which they had made from tree twigs. Some of Pompey's troops were supposed to have drunk the mixture, and were driven out of their minds, and so were easily slaughtered (*Geographia* 12.3.18).

To the north, the Germanic peoples had a unified theory of honey which accounted for all its manifestations. The *Prose Edda* contains a concise account: The world ash tree, Yggdrasil, has three roots. One root lies in the spring of Mimir, which gives wisdom and understanding. Oðin himself gave up one eye for a single drink from the mead of this spring. Another root lies in the spring of Urð, "which is so sacred that everything that comes into

[28] A. I. Root, *The ABC and XYZ of Bee Culture* (Medina, Ohio: A. I. Root Co., 1980), p. 385.

[29] However, I have been told by A. N. Athanassakis that in Greece today there is a sugary substance called ζαχαρόμελο which is gathered from fir trees in the springtime.

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the spring becomes as white as the film... that lies within the eggshell". Snorri quotes from the *Völuspá* in the *Poetic Edda*:

> I know an ash-tree
> known as Yggdrasil
> a tall tree and sacred
> besprent with white clay
> thence comes the dews
> that fall on the dales
> it stands ever green
> over Urð's spring.[30]

After which Snorri comments "The dew which falls from it to the earth is called honey-dew by the men, and the bees feed on it." Rydberg observed:

> The flowers receive it in their chalices where the bees extract it, and thus is produced the earthly honey which man uses and from which he brews *his* mead. Thus the latter too contains some of the strength of Mimer's and Urd's fountains, and thus it happens that it is able to stimulate the mind and inspire poetry and song – nay used with prudence it may suggest excellent expedients in important emergencies.[31]

The white film of Urð's spring and the white clay of the ash tree have puzzled scholars. Ellis Davidson said:

> It is said that the ash is sprinkled with *aurr* from the spring. The meaning of this word is uncertain, but DeVries[32] takes it to mean clear, shining, water.[33]

It is clear enough that *aurr* is ash tree manna. In his *Altnordisches Etymologishes Wörterbuch*, de Vries' himself makes the following comment:

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[30] J. I. Young, trans., *Prose Edda*, pp. 42-46 (Gylfaginning 16).

[31] V. Rydberg, *Teutonic Mythology*, trans. by R. B. Anderson (London: Swann Sonnenschein, 1889), p. 438; cf. Tacitus, *Germania 22*.

[32] J. de Vries, *Altgermanische Religiongeschichte* (Berlin, 1957), II, p. 380.

[33] H. R. Ellis Davidson, *Gods and Myths of Northern Europe*, p. 195. *Aurr* in modern Icelandic means "mud, wet clay, loam". See Alexander Jóhanneson, *Isländisches Etymologisches Wörterbuch*, (Bern: Franke Verlag, 1956), p. 140. Jóhanneson derives *aurr* from *uer- "wet"; cf. Calvert Watkins, *American Heritage Dictionary of Indo-European Roots* (Boston: Houghton Mifflin, 1985), p. 74, s. v. *weg^{w}-.

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> Das wort wird auch gedeutet als 'glanz' und in diesem fall entweder aus urgerm. **auzom* 'glanz', glänzende flüssigkeit, verwandt mit lat. *aurum* 'gold' ...oder entlehnt aus lat *aurum*.[34]

Thus the white clay is in some sense also "gold". As Viktor Rydberg observed a century ago:

> Thus the world tree is among the Teutons, as it is among their kinsmen the Iranians, a *mead tree*...[35]

We may now return to the ash trees' most important service in Greece, as nurses of Zeus in the Diktean Cave on Crete. Rhea contrived to hide the infant Zeus from Kronos in this cave, and various stories are told about arrangements within the cave. Callimachus says that the Diktean Meliai and Adrastea took him into their arms, laid him in a cradle of gold, and gave him honeycomb to eat and the udder of the she-goat Amalthea to suck. It was at this time that bees first began to appear in the surrounding mountains (*Hymnus in Jovem* 47). In Diodorus Siculus' version the nymphs mixed honey and milk and also gave him Amalthea's udder. The bees' reward for their honey was their golden color and ability to withstand the cold of a mountain climate (*Bibliotheca Historica* 5.70). Apollodorus gives the nymphs' names as Adrasteia and Ida, daughters of Melisseus (*Bibliotheca* 1.1.6). Hyginus mentions other stories, naming goats and nymphs who are said to have been nurses of Zeus.[36] Virgil says that the bees fed Jupiter in payment for the ability to make honey (*Georgics* 4.150-152); Later Jupiter ended the dripping of honey from trees when he ordained labor for men (*Georgics* 1.131).

The universal presence of honey in these stories is not surprising: Honey was the first food given to Greek and Roman infants.[37] The presence of the ash trees has been more troubling. As was mentioned above, A. B. Cook wrote a long article in which he discusses the nurses as Μέλισσαι, or bee nymphs, and omitted

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[34] J. de Vries, *Altnordisches Etymologisches Wörterbuch* (Leiden: E. J. Brill, 1962) s. v. *aurr*, p. 20.

[35] Rydberg, *Teutonic Mythology*, p. 439.

[36] Hyginus, *Fabulae* 139, 182; *Astronomia* 2.13. See also G. H Bode, ed., *Scriptores Rerum Mythicarum* (Cellis: E. H. C. Schulze, 1834), 1.104, 2.16, pp. 34, 79.

[37] Hermann Usener, "Milch und Honig", *Rheinisches Museum* 1902, pp. 177-195. See especially footnote 20.

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all mention of ash trees.[38] However, if the Μελίαι are considered to be both ash tree nymphs and honey nymphs due to their production of manna and honeydew, the common elements of these stories make considerably more sense. And strong confirmation of this connection can be found in recent folklore: Apparently even as recently as the beginning of this century, there were Germans who gave newborns honey from ash trees, and Scottish highlanders who gave infants sap from the ash tree for their first food.[39]

The goat Amalthea recalls the goat Heiðrun of Norse mythology, which bites stalks off the branches of the world ash tree and then yields mead from its udders into large jars for the enjoyment of those feasting in Valhalla.[40] One can imagine an earlier version of the story in which the bees were altogether absent, and the ash trees and goat by themselves were sufficient to carry honey mead to Zeus.

The idea of honey raining from heaven onto the world is found in Indian mythology also, and the divine intoxicant Soma is identified in the Vedas with honey that falls from the skies. The twin horsemen Ašvins have a honey whip (*madhuraša*), which has been interpreted as lightning. *Rig Veda* 1.157 is a prayer to them: "Bedew our power with honey and with oil... sprinkle us with your whip that drops honey-dew".[41]

Macdonnell said:

> In both the *Rig Veda* and the *Avesta* it is stated that the stalks [of Soma] were pressed, that the juice was yellow and mixed with milk; in both it grows in the mountains, and its mythical home is heaven, whence it comes down to earth.[42] ...Soma is the branch of a ruddy tree (*Rig Veda* 10.94.3) . ...The Soma drops themselves are several times compared with rain (*Rig Veda* 9.41.3, 9.89.1, 9.106.9) and Soma is said to flow clearly with a stream of honey like the rain-charged cloud (*Rig Veda* 9.2.9). ...The belief in an intoxicating

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[38] A. B. Cook, "The bee in Greek mythology", *JHS 15* (1895), PP. 1-24.

[39] Charles M. Skinner, *Myths and Legends of Flowers, Trees, Fruits, and Plants,* Philadelphia: J. P. Lippincott, 1925), p. 54.

[40] J. I. Young, trans., *Prose Edda*, p. 64.; L. M. Hollander, trans., *The Poetic Edda, Grimnismal 25*, p. 58.

[41] R. Griffith, trans., *The Hymns of the Rig Veda* (Varanasi: Chowkhamba Sanskrit Series Office, 1963).

[42] Macdonnell, *Vedic Reader* (Madras: Oxford University Press, 1917), p. 154.

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> beverage the home of which is heaven, may be Indo-European. If so, it must have been regarded as a kind of honey mead (Skt. *mádhu*, Gk. μέθυ, As. *medu*) brought down to earth from its guardian demon by an eagle (the Soma-bringing eagle of Indra agreeing with the nectar-bringing eagle of Zeus and with the eagle which, as a metamorphosis of Odhinn, carried off the mead).[43]

A huge volume of research has been published about Soma. A large recent bibliography appears in *Haoma and Harmaline* by D.S. Flattery and M. Schwartz.[44] They argue that the Iranians in their *haoma* used a species of *Ephedra*, the American species of which are sometimes called Mormon Tea. No summary of the state of the debate is possible, but it appears that no one has considered the possibility that *soma* is the memory of a honey mead beverage based on fermentable "honey" obtained from plants. Ash tree manna, as the *Dispensatory of the United States of America* noted, is fermentable, and ash trees do grow in India, including *Fraxinus excelsior* (the species familiar to the Germanic peoples), but only in the Himalayas above the elevation of 1300 m.[45]

Furthermore, *soma*, like the ash tree, is connected with newborns both in folk practice and in myth. among modern Parsis in Bombay, newborns are still given a few drops of *haoma* (in the form of *Ephedra*) as a medicine of longevity,[46] and in *Rig Veda* 3.32 we are informed that the first thing Indra did after his birth was to drink *soma* with pleasure. And there is an element of intoxication in the stories of Zeus' infancy: While Amalthea and the ash tree nymphs nursed Zeus in the cave, the Curetes, a warrior band, stood guard outside, drowning out the sound of Zeus' cries with their tambourines, and dancing terrifying war dances. They were in a state of orgiastic possession.[47]

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[43] A. A. Macdonnell, *Vedic Mythology* (Strassburg: Trübner, 1897), pp. 104-114.

[44] D. S. Flattery and M. Schwartz, *Haoma and Harmaline, University of California Publications: Near Eastern Studies*, vol. 2 (University of California Press, 1989), pp. 153-172.

[45] J. D. Hooker, *The Flora of British India* (Brook, Kent: L. Reeve and Co., 1882) vol. 3, pp. 605-606.

[46] S. Madhihassan, "Ephedra, the Oldest Medicinal Plant with the History of an Uninterrupted Use", *Ancient Science of Life*, vol. 7 no. 2 (1987), pp. 105-109. The author believes that *Ephedra* was the original *soma*, but notes the apparent equivalence of *Fraxinus excelsior* in that both were the source of a newborns first food.

[47] Apollodorus, *Bibliotheca* 1.1.7; Strabo, *Geographia* 10.3.10-11.

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Calvert Watkins provided another link between *soma* and European customs in an article published in 1977 which discussed the various mixtures of honey, grains, spices, etc. which appear in Greek literature[48] and are still drunk in modern Greece.[49] One famous example is in book 10 of the *Odyssey* (lines 233-236) in which Circe mixed a drugged beverage that turned men into swine. Watkins notes strong parallels between the accounts of the Greek beverages and the Soma ritual. His conclusion is that there was "a single Indo-European liturgical cultic practice" which gave rise to the Vedic and the Indo-Iranian Soma ritual, to the act of communion of the Eleusinian mysteries, and an archaic Greek warrior ritual by women for men, all involving a mixed potion.

Those who have studied the history of mead have commented that the fermentation of mead was unreliable, and that this may explain the origin of these mixed beverages:

> This is an ideal medium for the growth of many undesirable microorganisms, which will multiply if not suppressed by yeast growth (the opposite is true of most ripe fruits, including grapes, whose surface is covered with yeast cells.) Excellent mead can be made without the addition of spices and herbs, just as good meat is not in need of improvement. The strength, as well as the quantity, of many of the materials added in these old recipes – either before or after fermentation – strongly suggests an attempt to mask a poor or faulty product.[50]

One can imagine a migratory people, collecting honey, honeydew, and sweet tree resins (calling them all by the same name), fermenting them into a frequently bad product, and throwing in aromatic herbs of every variety, which varied in the course of migrations. There is no reason that every speculation about the hallucinogenic ingredients of *soma* ever made could not have been true at some place and time. But it seems likely, if the mead of the gods was thought to flow through the ash tree, that ash tree manna in the *Urheimat* had a symbolic significance in establishing communion with the gods, which after the Indo-Iranian peoples migrated

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[48] C. Watkins, "Let us now praise famous grains", *Proceedings of the American Philosophical Society 122*, pp. 9-17.

[49] A. N. Athanassakis, personal communication.

[50] R. A. Morse and K. H. Steinkraus, "Wines from the fermentation of honey", in E. Crane, ed. *Honey*, p. 395. The authors studied medieval recipes.

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into a tropical area far from ash trees, was remembered only in a most confused manner.

An interesting confirmation is found in the rituals of a Finno-Ugric people who were never converted from their heathen religion. Ellis Davidson has commented on the importance of Finno-Ugric mythology to the understanding of Norse mythology, since there are marked resemblances between the two systems, including the idea of a world tree. In rituals, the Finno-Ugric shamans would ascend the tree symbolically, passing in a state of ecstasy through a series of heavens.[51]

The Cheremiss (or Mari), a Finno-Ugric people, were observed in 1913 by Uno Holmberg.[52] Their homeland lies on the Volga river about 150 km. east of the nearest ash trees.[53] The central tree of their ritual was the lime tree. (Lime tree here is in the older sense, still maintained in Britain, of Linden tree). The lime tree exudes sugary material in great quantity, as is noted in a popular work on bees and honey:

> As anyone who has a lime or sycamore in the garden will know, the sticky honeydew generally becomes coated with a black unsightly mold, like soot, as the summer advances... I have tasted pure honeydew "honeys" which looked like axle-grease, but were palatable and in some cases excellent.[54]

And it was noted that, at least before the revolution, "in Russia a drink termed *lipez* is made from the delicious honey of the linden."[55]

The following details of a Cherimiss ceremony in a sacred grove of lime trees are sufficient to suggest a relationship to the ancient tradition suggested by Calvert Watkins, in which women serve men a honey beverage:

> To the right of the sacrifice tree, a little round pillar is also stuck in the ground, and a little wooden bowl placed on it. Into this a drink

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[51] H. R. Ellis Davidson, *Gods and Myths of Northern Europe*, p. 192.

[52] U. Holmberg, "Finno-Ugrian, Siberian mythology", in J. A. MacColloch, ed., *The Mythology of All Races* (Boston, Marshall Jones, 1927), vol. 4.

[53] Hulden, "Studien über *F. excelsior*", map p. 230; cf. Holmberg in MacColloch, *Mythology of All Races*, map, p.1.

[54] D. More, *The Bee Book* (New York: Universe Books, 1976), p.73.

[55] *Encyclopedia Britannica*, 11th edition, s.v. "honey".

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> of honey is poured, but judging by the name "resin-bowl" it must formerly have contained resin... Before all this, white cloths are spread on the ground bestrewed with lime branches, and on these rows, the sacrificial "butter and milk" loaves are placed touching one another... Behind the loaves nine wooden bowls are laid parallel with these. Later a drink made of honey is poured into them, the drink being prepared for the festival by young maidens.[56]

This ritual, which connects trees, tree resins, and honey, may be added to the literary evidence already cited, which has shown similar associations in Greek, Germanic, Vedic, and Avestan sources. The world tree for Indo-Europeans was indeed a mead tree, and it rained celestial honey on the world. The secretion of fermentable honey by the ash tree gave the Indo-Europeans good reason for their particular attention to that tree, and for their apparent belief that it was the nurse of gods and men. The honey in its perfect and original form which flowed through the tree provided the food of the gods. Recall that Indra is celebrated for drinking great pools of *soma*[57], Oðin eats no food and drinks only "wine"[58], and the nectar and ambrosia of the Olympian gods is often compared to honey.[59] Therefore just as the world ash physically linked gods and men, its fermented resins could provide communion between gods and men.

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[56] Holmberg, pp. 266-267. It is possible that the observer didn't know the origin of the "honey" in the resin bowls.

[57] *Rig Veda* 1.104.9, 6.17.11, 8.66.4, etc.

[58] J. I. Young, trans. *Prose Edda*, p. 66.

[59] C. Daremberg and E. Saglio, *Dictionnaire des antiquités greques et romaines* (Paris, 1875), s.v. "ambrosia", "nectar", "mel".

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The Line and the Labyrinth: Symbolic Keys to Cultural History

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History, says T. S. Eliot, "has many cunning passages, contrived corridors" ("Gerontion" 35). One of the strangest occurs in the labyrinth of the Minotaur where the Greek hero Theseus finds his way out through the help of a "clue" given him by Ariadne, the daughter of his enemy, King Minos. Theseus escapes the maze by means of a "thread" by which his return becomes predictable; he follows his way in a continuous line, retracing sequences of his earlier trip into the labyrinth.

What does this story signify? Many things, to be sure, not the least of which is the psychological projection of the archetypal father/lover/daughter complex. In my view, it also illustrates a dramatic cognitive moment in the archaic mind, a new sense of mental prowess, a "life-line," as it were, out of the labyrinthine relationships of mythical-tribal lifeways.

That Theseus's trip was a paramount symbol of emerging Hellenic rationalism is stressed by Joseph Campbell in the opening chapter of *A Hero With a Thousand Faces*: "Theseus, the hero-slayer of the Minotaur, entered Crete from without as the symbol and arm of the rising civilization of the Greeks. That was the new and living thing" (17). What was the source of this new "rising civilization?" Clearly it had to do with the image of the "thread" winding its way through the Cretan labyrinth. The concept of historical developmentalism suggested in Campbell's account will also be a major concern of this study. Mine, however, involves the growth not only of Hellenic rationalism from prehistoric mythic subsoils, but the development of the more abstract rationalism of our modern lifeways.

In an article entitled, "Ariadne's Thread: Repetition and the Narrative Line," J. Hillis Miller links the thread image to Western linear logic (55-77). This is, I think, an essential clue to its meaning. I would extend Miller's original insight in the direction of cognitive evolution. The thread represents for me a symbolization

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of those linear logical processes which, for better and worse, created the *ratio* of Hellenic linguistic-mathematical thinking and ultimately Western scientific culture.

II

"There is," Circe says to Odysseus, "a mind in you no magic will work on" (*Odyssey* 10.329). Could this statement be understood in terms of actual historical evolution, that is, that Odysseus really had a kind of new mind? I believe this is the case, that Odysseus, like Theseus, possessed novel logical-linguistic powers to combat the older world of mythic forces. This is most in evidence in Polyphemous's cave where the Greek hero tricks the giant by playing a mental joke on him, telling him that "Nobody is my name" (9.366). This mental agility was part of a larger power, a "linear logic" (planning step-by-step in a chain of causes and effects, and realizing the protection the name "nobody" might later have).

As I perceive it, the evolution in cognition went through many gradual shadings best expressed in the movement from mythic, labyrinthine "story," to linear-rational, moral "drama," to abstract linear "clock" (or today, "computer"). These changes occurred largely because of newly constructed symbolizations of man and his world, such as the seventeenth-century picturing of the world as a great clock moving in mathematical linear patterns. My general focus here will be on key literary instances of line and labyrinth in uncovering this essentially threefold structuring in historical consciousness.

The first state I call "primaconsciousness," the mode of mythic thinking. This is marked by the sense of a "storied," emotional participation in reality, dominated by imaginal thinking. In it linear processes are subordinate to myth's patterns which function in a holistic, *labyrinthine* fashion. With the rise of the so-called "historical cultures," linear logic and time consciousness undergo a greater elaboration within mythic thought, gradually creating the beginnings of a second consciousness, which I call "metaconsciousness." The latter is marked by a more differentiated, linear-type cognition, and by a sense of sequential temporality and rational-moral choosing. Although this new consciousness is inchoately dramatized in the narratives of Osiris and Gilgamesh, its full embodiment comes in Homer's epics, in Greek drama, philosophy

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and science. Finally, with the rise of Western science, appears a third stage, which I call, "techniconsciousness," representing a world-view shaped by an abstract linear-technical ethos.

III

To understand this evolution better, we must return to the concept of linear logic. "The model of the line," says J. Hillis Miller, "is a powerful part of the traditional language of Occidental metaphysics, ... an organizational system of casual chains and inevitable sequences moving straightforwardly to a desired end" (69). Furthermore, "line," itself reaches out etymologically to include related ideas of setting limits, drawing boundaries, establishing laws, finally embracing the whole realm of word, speech, and reason (69).

The notion of linear orderliness, especially in terms of temporal structuralization – that is, that things have distinct beginnings, middles and ends – is rooted deeply not only in Aristotelian logic but in our Western orientation to nature (Lee 138). A second major domain of our lives, language, is also linear in structure. "The signifier," Robert Scholes quotes Ferdinand Saussure, "being auditory, is unfolded in time...; it is a line" (16). Scholes goes on to explain: "And, of course, not only is each sign linear, each utterance is even more obviously so" (16). Furthermore, the alphabet and writing are also, as Marshall McLuhan has argued, "lineal" modes of communication which "made possible the sudden invention of 'grammars' of thought and science by the Greeks" (33).

But if linear logic was vital to the development of early rationalism, its role seems essential to later scientific processing of reality. In her "Codifications of Reality: Lineal and Nonlineal," Dorothy Lee, contrasting non-linear primitive thought with Western cognition, points out: "The line is found or presupposed in most of our scientific work. It is present in the *induction* and *deduction* of science and logic. It is present in the philosopher's phrasing of means and ends as lineally connected" (133). Furthermore, linear causation, based on a mathematical view of time as a "uniform line of successive instants" also underlies the assumption of most historians (Haber, "Darwin" 289). Indeed Jefferson's *Declaration* – "When in the course of human events..." is based on

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an " historical, linear explanation" (Diggins 58). Finally, in the domain of poetry, which has been most resistant to linearism, a leading literary critic, Walter Ong, notes new poetic dispositions to accept "linear-type change" (113), observing that "a sense of history, seen as evolutionary development, has now become an inevitable dimension of all reflective human existence..." (117).

IV

Our interpretation of Theseus as an evolved "linear-type" thinker becomes clearer, I think, in the context of the emergence of Apollo onto the mythic stage. In the Greek story Theseus is a "man of reason and Apollonian clarity" (Miller 62). Apollo, in turn, as W. K. C Guthrie notes, represents the Greek preference for "the intelligible, determinate, mensurable, as opposed to the fantastic, vague and shapeless." Guthrie notes further Apollo's "championship of law and order, his widespread legal activity embracing criminal, civil and constitutional codes, everything whether in religious or secular life that was brought under rules and regulations" (183, 203). Theseus's close association with these activities is clear in Plutarch's *Lives* where he takes on the tasks of laying down new urban regulations. "Forming in his mind a great and wonderful design," Plutarch reports, Theseus consolidated "all the inhabitants of Attica into one town and made them one people of one city." He then "proceeded to form a commonwealth," based on a logical system of differentiation and ranking – he "did not suffer his state ... to be left without order or degree, but was the first that divided the Commonwealth into three distinct ranks ..." and committed to each rank the duties of religion, law and commerce commensurate to their ranking (9). Here was lawgiving based on the precise dividing of parts and the recognition of boundaries – in short, a linear rationalistic disposition. The development of such dispositions represented new logical development, and *not* necessarily, of course, a progression to moral betterment. Thus the "thread" does not unwind Theseus into a fuller human hero; rather the story immediately tells of his abandonment of Ariadne. And significantly, Theseus's final fate involves his own tragic betrayal by a fellow king, who luring him to a high cliff, throws him to his death (14).

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V

The "thread," however, is but one element in the Theseus tale. How do the labyrinth, Minotaur and Ariadne fit into our argument? "Classical Greek Civilization," as Leon E. Stover and Bruce Kraig say, was "outwardly an Indo-European product, but submerged within it Old European iconography recurs again and again... " (26). Leading Hellenic scholars have all stressed the continuity of pre-historical cultures in the makeup of the Greeks (W. K. C. Guthrie, M. P. Nilsson, E. R. Dodds, Walter Burkert). The point seems especially pertinent to the mythic triad mentioned above: writing of sixth and seventh-century B.C. renditions of the Theseus story in *Mythology: An Illustrated Encyclopedia*, Richard Cavendish says, "This presentation of Ariadne, the Minotaur and the Labyrinth ... is surely not the original one, which may have involved a goddess, a sacred bull and a shrine..." (131). Do the roots of the Theseus story lie in archaic mythic cults? Maria Gimbutas in her *Gods and Goddesses of Old Europe, 7,000-3,500 B.C.*, traces a fascinating route of labyrinths-bulls-goddesses imagery directly to Knossos. The Cretan labyrinth, she shows, was but another abode of the Snake and Bird Goddess, whose ancestry goes back through prehistory in such manifestations as the "Mistress of the Animals," and "Mistress of the Labyrinth" (123).

Ariadne's connection with fertility goddess figures is further suggested in Plutarch's association of her with the "Crane" dance – "consisting in certain measured turnings and returnings, imitative of the windings and twisting of the labyrinth" (8) – performed by Delian youths in Ariadne's and Theseus's honor. The Crane was a traditional incarnation of the prehistorical Bird-Goddess (Gimbutas 125). As for the Minotaur, throughout old European prehistory representations of bulls' horns, and the crescent phases of the moon were interconnected with snake, bird and water imagery, and found widespread in cave-like temples (91-136).

The centrality of such visual-mythological iconography in Minoan religion has large significance. It afforded, I would argue, a kind of basic pictorial script of early thought, or primaconsciousness. Such imagery acted as fertility "cues," holistically arranged for the perceiver to intuit and imitate the cyclical rebirth of nature. The "Great Goddess," mythical heroine with a thousand faces throughout prehistorical times, found, it seems, a crucial niche in Knossos in her incarnations as moon, bird, and snake goddess,

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mistress of the labyrinth, and finally Ariadne, the lover of a Greek warrior. All these connective strands suggest that Theseus's entry into the labyrinth symbolizes not simply the triumph of one culture over an earlier one, but rationalism's interpenetration into a long-existing mythic mentality.

VI

What did the labyrinth signify in this mentality? Labyrinthine meanders, especially of water, were analogically webbed together with images of the coiling of snakes, the crescent shapes of bull horns, the swelling anatomies of animals and women – all in a visual-kinesthetic complex centering upon rebirth. Closely linked to initiation rites in sanctuary caves, such iconography existed as a kind of Pre-Minoan symbolic shorthand in which the labyrinth represented a pervasive state of mind – the mysterious, non-logical world of fertility and magic.

What was the cognitive source of this state of mind? It was, I believe, the structuring of mythic thinking itself which operates through pre-differentiated complexes. Such states have been illumined by Ernest Cassirer in his discussion of the "mythic state of mind":

> It seems only natural to us that the world should present itself to our inspection and observation as a pattern of definite forms, each with its own perfectly determinate spatial limits that give it its specific individuality. If we see it as a whole, the whole nevertheless consists of clearly distinguishable units, which do not melt into each other, but preserve their identity that sets them definitely apart from the identity of all the others. But for the mythmaking consciousness these separate elements are not thus separately given, but have to be originally and gradually derived from the whole; the process of culling and sorting out individual forms has yet to be gone through. (13)

Such prelogical forms appear, from the perspectives of sequential ordering, *labyrinthine* in their undifferentiated shapings – intricate knots, complex and phantasmal. The "thread," moving through such maze-like configurations, can be seen as the undoing of this mythic knot. The line is, as it were, a mental cutting of the Gordian knot, laying out myth's clustered relationships into a neat, predictable series of casual chains.

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VII

Moreover, in the Theseus myth we see mirrored not only a cognitive revolution, but a profound social reorientation. What the "new and living thing" Theseus also symbolized was a psycho-historical process akin to that described by John Perry in his description of the formation of the Western ego. "When," he says, "the matriarchal order in Greece gave way to patriarchy, the sky god Zeus, took the ascendancy, and the divine son was Apollo," who represented "the later differentiated Greek consciousness with its clear thinking, the 'day mind,' as against the more primitive 'night mind' of the earlier age so prone to magic oracle, and dream" (124). It was the dawning of the Western sense of the individual, the masculine measurer emerging from out of the nature-worshipping worlds of the Mediterranean dominated by fertility goddesses such as Demeter, and the "Great Mother of Asia" (Guthrie 30). This measurer brought death awareness with him, beginning the separation from the atemporal mythic worlds of older human cultures.

This "differentiated" consciousness signals the second stage of consciousness I have spoken of. Perry's account, however, too sharply cuts the worlds of Hellenism and mythic dream apart. The primaconsciousness world is undifferentiated and full of dream-like imaginal complexes. However, there exists no sudden, total rupture of this mentality and a more differentiated type in Hellenism. What, indeed, the Theseus tale allegorizes is how for the first time the new power of linear thinking coexists within the mythic state of mind.

Thus on one level, Theseus's journey resembles the dreamlike rites of passage which folk and fairy tales universally employ to project psychoerotic concerns. There is the same web of ritualistic, storied actions centering on complexes of rebirth imagery. But, on another, historical level it projects the life-story of an Athenian hero's maturation, one similar, as we shall see, to Gilgamesh's. And whereas the linear manifestation in *Gilgamesh* takes the shape of an intense sequential consciousness of time and death, its manifestation in Theseus becomes focused on the thread image, for behind this image lies the cognitive lever of linear logic by which Hellenic civilization began to move the world. Preclassical Greece's self-image, one might say, is locked up, in this monster- slaying tale, as is

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the case with Odysseus and Polyphemos. And this is also true of that later figure, Oedipus, whose story is a tragic search for linear "clues" to the labyrinthine mysteries of destiny.

VIII

In the third and second millennia B.C., similar shifts to a linear, measuring consciousness appeared throughout the Near East. Their beginnings can be seen in the symbolic actions of measurement imposed by Seth upon Osiris, whose body is measured, and put into a watery coffin. "Seth," says William Irwin Thompson, "is the principle of limitation, of numbering the One into the many; because he learns the numbers of Osiris's body he learns about its inmost nature..." (216). In Mesopotamia parallel linear logical implications can be seen in the earliest forms of writing, codes of laws, bureaucratic record-keeping; but the most striking evidence appears in literature.

Gilgamesh (which also recounts the story of a bull- slaying hero) retains key elements of the primaconscious script of rebirth – female fertility goddesses; imitational reenactments; snake, water and plant images – but these are now, as in the Greek world, redirected towards worship of a patriarchal sun-god. For example, during a dreamlike journey to the forest of the Goddess (Inanna), to do battle with her monster (Humbaba), Gilgamesh performs ritual gestures to the sun god, Shamash (*Gil*, 5. 2. 46-50).[1] Following this Gilgamesh kills a sacred bull sent by the Fertility Goddess (504) – an "acrobatic feat," notes N. K. Sandars, "like that performed in the bull games of Crete" (35). Finally, primaconscious images of water, plant, and snake dominate the poem's ending when the hero passes over the "waters of death" (10. 2. 25) and is given a magic plant (11. 1. 268- 270), only to lose it to a snake (11. 1. 287-8).

Alongside these persistent archaic elements is a new time-dependent sensibility. Thus Gilgamesh says to Enkidu: "Only the gods d(well) forever with Shamash. / But for mankind, their days are numbered" (5. 4. 141-2). Focus is now on the sequential

[1] The text I use is *The Gilgamesh Epic* in *The Origins of Civilization* edited by William H. McNeill and Jean W. Sedlar. The first number refers to tablet, the second to column, and the last to lines cited.

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transitoriness of things. Gilgamesh and his friend Enkidu recognize that they now live, as Thompson says, a life of "linear, phallic extension," a "life with a beginning and end" (195). Individuation and self-consciousness accompany this recognition; Gilgamesh quests for individualism and fame: "If I fall, I will establish a name for myself," (3. 4. 148) – and the whole epic celebrates the rise of an urban-centered patriarchal civilization.

IX

It is in Homer, however, that we see the first full interconnection of mythic story and linear-linguistic forms. In his *Paideia*, Werner Jaeger comments on the combination of myth and rationality among the Greeks:

> It is hard to fix the point when rational thinking begins in Greece. The line should run through the Homeric epic. Yet it is hardly possible to separate "mythical" thinking in the epic from the rational ideas with which it is interpenetrated. (151)

The *Iliad* begins with a world entangled in a web of anger. The air is electric with disaster; even Apollo is seen as an angry avenger: "What god was it then set them together in bitter collision? / Zeus' son and Leto's, Apollo, who in anger at the king drove / the foul pestilence along the host, and the people perished" (1.8-10). Yet if the narrative plunges us into a scene of irrational passions, there are more traditional Apollonian countermoves of moderation, such as Nestor's appeal for reasonableness, and similar speeches in the public assemblies. And in the final book we see Apollo projected as a god of restraint: "No, you gods; your desire is to help this cursed Achilleus / Within whose breast there are no feelings of justice, nor can / His mind be bent, but his purposes are fierce, like a lion... (24. 39-41).

This rational containing of primitive energies reflects the larger linguistic ordering within the poem. At the beginning Achilles's anger is filtered through a causal chain, linked first to the dead multitudes of the "strong souls of heroes" (1.3-4), who are then lineally connected to the conflict between Achilles and Agamemnon which, in turn, is subsumed under the inevitable sequences of actions, leading to the desired end – the accomplishment of Zeus's will. Everywhere the line interpenetrates the labyrinth of emotions

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in this, one of the first and most perfectly realized rationalizations of myths.

As in *Gilagmesh*, the *Odyssey* seems constructed of major elements from the prehistoric repertoire – water, snake, fertility goddesses, plant, monsters. Yet, at the same time the *Odyssey* presents a leap forward in the logical make-up of the hero. Because of Odysseus's mental resourcefulness, he becomes a successor to Theseus in his linear thinking, and much more, a success in obtaining human fullness. Like Gilgamesh, Odysseus is a voyager who, having suffered many misfortunes, returns home wiser. He, too, travels over water, is given a magic plant ("moly"), and journeys to an underworld. Another telling connection lies in Odysseus's encounter with Polyphemos, a man-eating monster, reminiscent of the Minotaur. In this episode, the primaconscious format is carried, I believe, from ancient European caves through the forests of *Gilgamesh* and labyrinths of Minos straight into the Cyclops's lair.

In Book IX, Apollonian Odysseus plans how best to prepare for an encounter with the "lawless ... monster of a man" (9.186, 189). He distributes his men to various tasks, taking along the best, remembering to bring special wine, which comes from "among the trees of the sacred / grove of Phoebos Apollo" (9.200-01). Carefully calculating, Odysseus approaches with the assurance of a skilled technician and linear problem solver. (Loren Eiseley notes the "technological cleverness" of Odysseus's blinding of Polyphemos [*Star Thrower* 19]). Rational organization and dream-adventure merge in the cave, the atmosphere resonant with fairy tale fantasies of being swallowed up by man-eating cave dwellers. But against the pull of such frightening dreams stand the strategies of the new linear thinker, Odysseus.

The culmination of Odysseus's rational victories over Polyphemos lies in his play on the name he ascribes to himself: "Nobody is my name. My father and mother call me / Nobody, as do all the others who are my companions" (9.366-7). This manipulation of symbolic communication enables Odysseus to place Polyphemos in a linguistic-logical trap – later the monster will speak his tormentor's name accurately: "Nobody" did it – but the ambiguity defeats Polyphemos's hope for relief from his brothers. Theseus's thread has now become supple logical processes against which no magical giants can contend.

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X

The emergent rational-mythological state of mind, which I call metaconsciousness, is more fully displayed in the Platonic "cave-drama." This progression involves a "rationalization-of-myth" process which Jaeger further comments upon: "... we must interpret the growth of Greek philosophy as the process by which the original religious conception of the universe, the conception implicit in the myth, was increasingly rationalized ..." (152). We can see this evolution in the moral choice each character makes in the *Republic's* concluding myth of Er: "... the responsibility is with the chooser – God is justified"(617E), says Plato. This focus on moral differentiation parallels that of the more famous "allegory of the cave" episode where rational enlightenment penetrates the "dark" primaconscious world of superstitious illusions (514-17). The linear-linguistic subtleties of the Platonic *Dialogues* are, I would argue, elaborations of the power allegorized in Odysseus's mental game in Polyphemos's cave. Now, however, the emphasis is on the morally differentiating powers of the mind.

As in the *Iliad* and the *Odyssey*, in Plato there is profound continuity with primaconsciousness. Plato's, however, is a religious-rational *mimesis*, and we clearly move onto more abstract planes of logical language (Truth, Beauty and Goodness). The consciousness transformation which began in the Hellenic experience with a new type of public discourse (O'Keefe 90), emphasizing debate and argument now becomes channeled into the formalized discourse of philosophy. Life is a *conscious* ("the unexamined life is not worth living") drama in which the participant must differentiate between good and evil and so choose the path to salvation.

XI

The amalgam of Judaism and Platonic script fostered by Paul and St. Augustine reinforced this concept of rational-moral choosing, placing it within a Providential *mythos* of salvation. The complex Christian model projected a mythic rebirth scenario, a metaconscious choosing of Christ over sin, and finally a new linear forward motion to redemption (the apocalyptic vision of the Second Coming).

In the Middle Ages a complex linear-cyclical formula was

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erected to guide the Christian pilgrim. Chaucer's *Canterbury Tales* dramatizes some of the subtleties of this model: at its outset the narrator projects a straightforward journey to the goal of Canterbury, but we soon see that this linear movement is not "arrow-straight" (Donaldson 876), but enveloped in mythic cycles of rebirth, a labyrinth of spiritual and secular motivations. *Amor vincit omnia* is the poem's ultimate Christian statement, as it was in the similar, but more powerful journey of the greater pilgrim, Dante. The *Commedia* is an intensely spiritualized version of the Theseus-Odysseus-Platonic cave story, reflecting new activations of linear-linguistic powers within the Christian mythos.

XII

The metaphor of life as a spiritual drama epitomized metaconscious thinking through the Middle Ages and into the Renaissance. How, then, did the emergence of a mathematical vision of nature – epitomized in the image of the clock world – become so all-encompassing in post-Renaissance Europe? It was the result, I would argue, of new urges to restructure the world in terms of more abstract *linear* transactions with reality. This was accomplished in large part through an intricate "re-presentation" of reality, stimulating man to see nature less as a world animated by human and divine purposes, and more as one, as Bronowski states, "running in a steady mechanism of before and after" (27).

Descartes was a major force in this cognitive revolution. For him, true reasoning involved breaking down problems, and logically reassembling them into mathematical units. "Clear and distinct" ideas were gained by a methodology which Morris Berman describes thus: "It [the mind] confronts the world as a separate object. It applies this method to the object.... Subdivide, measure, combine: subdivide, measure, combine" (34). Such a method called for a kind of disengaged Spectator; the Western self as observer and controller of an abstract, linear universe was emerging.

In seventeenth-century France Descartes's theories were made accessible through a popular presentation which aided in the imaginative reconstruction of the prevailing spiritual-metaphoric model. Bernard de Fontenelle's *Pluralities of Worlds* (1686), which won such widespread fame that it became "an important event in

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the growth of the Enlightenment" (Shackleton 30), opens in a lady's garden where Fontenelle elaborates the idea of a clock-like world into an enlarged and influential metaphor:

> I fancy to myself that Nature very much resembleth an Opera, where you stand, you do not see the Stage as really it is; but it is plac'd with advantage, and all the Wheels and Movements hid to make the Representation the more agreeable.... an Engineer in the Pit is affected with what doth not touch you; he is pleas'd with the motion, and is demonstrating to himself on what it depends, and how it comes to pass. (7-8)

The human comedy is seen as a vast mechanical show, with nature's symbolic actions transplanted onto a single plane of mechanical operation. But something older was at work in this mechanical re-presentation of nature. What was crucial to it was the layering of mythic, metaphoric and linear measuring components in the human mind. We can see this in the history of clocks and their surprising evolution.

XIII

From the fourteenth to the sixteenth century in Europe there existed huge astronomic clocks dramatizing the world through spiritual-mechanical formats. These cathedral clocks, especially at Strasbourg (c.1572) functioned not as utilitarian time pieces, but as cosmic simulations and religious aesthetic devices. In them simulacra automatically acted out major events of man's existence – life-like figures of the ages of man paraded across the stage where Christ battled Satan. The spectacle contained a symbolic code, which, in Francis C. Haber's words, "the viewer could understand and complete for himself.... The assemblage of symbols was the key to the whole story of the Divine Creation, so that from the code the clock would be read like a book and watched like a play" (404).[2] Here was a religious spectacle, but *also one run by automated, linear sequences of events*. On the one hand, a spiritual, qualitative sense of time was built into these perceptual expectations, a rehearsing of a spiritual maturation. On the other hand, another completion was possible, a quantitative one, through a

[2] I am indebted to Haber's study of clock symbolism.

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resetting of brain and eye to see merely mechanical objects moving in sequences of before and after.

The quantitative view of the drama in the Strasbourg clock received frequent mention in Descartes and Boyle as a valuable representation of reality (Haber, "Cathedral" 404). Through such writings, leaders of the scientific revolution, as well as popularizers like Fontenelle brought the mechanistic notion of the world to the forefront of human consciousness. To be sure, Nature was still qualitatively conceived of as a "great show," and one to which we ought to respond, but only on a *secondary* level of subjective emotions. The new philosopher was to mentally abstract the true, i.e., quantitative, linear operations that were, it was implied, the only true reality man knows.

XIV

Throughout the Renaissance the elaboration of more differentiated, linear thought patterns led to the breaking down of preexisting mythic analogical schemes. Writing of the creation of the modern world in the writings of Cervantes, Carlos Fuentes notes how Don Quixote

> ... illustrates the rupture of a world based on analogy and thrust into differentiation. He makes evident a challenge that we consider peculiarly ours: how to accept the diversity and mutation of the world while retaining the mind's power for analogy and unity, so that this changing world shall not become meaningless. (15)

Similar unifying concerns were central, as was the line/labyrinth symbolism, in Shakespeare's comedies, tragedies and romances. In *Midsummer Night's Dream* for example, Theseus reappears as a kind of linear-type lawgiver in a world of mazes. He soon discovers that "the course of true love never did run smooth" (1.1.136), for Nature's way defeats mazetreading: "And the quaint mazes in the wanton green / For lack of tread are indistinguishable" (2. 1.100- 6). In the play the four young lovers are, as Rene Girard puts it, in a "crisis of identity," which "is primarily one of differentiation" (203) – one which the comic plot resolves by returning to a mythic state of labyrinthine undifferentiation.

Hamlet is the play of "crisis identity" *par excellence*; like Oedipus, Hamlet searches for linear solutions: "Sure," Hamlet says, "he that

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made us with such large discourse, / Looking before and after," gave us not that "god-like reason" to go unused (4. 2. 230-1). But again, as in *Oedipus* this "god-like reason" can go too far: Hamlet becomes a spectator-manipulator of the world, probing and testing, only to cede in the last act to the ancient vision that there's "a special providence in the fall of a sparrow" (5. 2. 230-1). Shakespeare's last great play, the *Tempest* fuses strands of mythic magic ("here's a maze trod, indeed" [3. 2. 152], says Gonzalo of Prospero's island-world), with metaconscious rationality in a time of accelerating differentiation guided by scientific rationalism.

XV

The growth of an abstract linear coding of the world brought an intricate poetical response to it in seventeenth- and eighteenth-century England. The strategies of literary figures like Dryden, Pope and Swift were not simply to defend the older values, although they did this as part, as Wimsatt says, of "a spirited rearguard action in the retreat of Renaissance humanism before the march of science" (14). But they also incorporated the advancing presuppositions of the new scientific rationalism. Thus, much eighteenth-century art focussed on the idea of the spectator, and dealt with logical manipulation of received forms, particularly the epic and the pastoral, and with satiric dissections of society through formal verse patterns. The "Just Weight and Measure" ("Art of Poetry" 132) which Dryden found Waller using in verse, and enthusiastically passed onto the next age, reflected an increasing differentiating mentality, with precise timing and logical sorting processes dominating the whole tenor of poetry.

Assuming and retreating from evolved scientific rationalism, Neoclassicism developed a rhetoric which might be called the "rhetoric of differentiation." In it linear logic powers were everywhere in evidence but in the service of mythic-metaphoric values, as can be seen, for example, in poems like Pope's *Windsor Forest* with its religious apocalyptic conclusion; and in his *Dunciad* where the drama of Nature itself is seen shut down: "Thy hand, great Anarch! lets the curtain fall; / And Universal Darkness buries All" (4. 655-6).

The importance of the labyrinth and its connection with linearism in Pope is clear. In the *Essay on Man* the labyrinth

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operates as a central controlling image of the world – "A mighty maze! but not without a plan" (1. 6). In the margin of the Harvard manuscript Pope noted that this alluded to the "General Order and Design of Providence" (Mack, "Twickenham" 11-2). Pope expanded on the labyrinth image in the next two lines, making obvious the gardening reference – "A Wild, where weeds and flow'rs promiscuous shoot,/ Or Garden, tempting with forbidden fruit" (7-8). But in the next verse paragraph he developed the opposing "plan" idea through images borrowed largely from Palladian architecture: "But of this frame, the bearings, and the ties / The strong connections, nice dependencies, / Gradations just, has thy pervading soul/ Look'd thro?" (29-32). Here, as the Twickenham editor notes, Pope blends "architectural, hierarchical, and astronomical allusions" (16). Man's world is paradoxically envisioned (and lived in by Pope at Twickenham) as a Palladian palace surperimposed within a labyrinthine garden. The connections of the English Palladian style with linearism has been made clear by Nikolaus Pevsner, who showed how that style was a version of the "older Perpendicular", which relied on the straight line and on a linear grid for its effect of spatial clarity (90-127).

XVI

The mechanistic concept the world as a linear clock and "block universe," i.e., having "definitive and solid objects in definitive positions in space and time" (Hampshire 18), led to an opposite strategy among succeeding Romantic poets. It produced a "rhetoric of *de*differentiation," that is to say, the Romantic poet deliberately turned from differentiating thinking back towards primaconscious states. Thus Wordsworth's *Prelude* celebrates undifferentiated perceptions of nature; in the poem's beginning the maturing "I" sees an edgeless peak that seems to stalk him, and this is followed by a diffusion of self within the whole. Intuitive understanding guides the poet with "a dim and undetermined sense / of unknown modes of being;" (1. 392-3) "No familiar shapes / remained,... But huge and mighty forms..." (395, 8) In Book II linear processing is rejected outright – "But who shall parcel out / His intellect by geometric rules..." (203-4) or heed "that false secondary power / By which we multiply distinctions..."(216-17). In such poetry the labyrinthine mythic mind is recomposed by the agonies and

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ecstasies of the Romantic imagination, against which forever is barred the Apollonian thread of linear man.

XVII

The relentless march of linear logic in the nineteenth and twentieth centuries brought growing techniconscious control of the world. The urban industrialization of work and life that followed set off sustained reactions against the new ethos. "Geometric, linear cities," John Fowles comments in a recent reaction, "made for "geometric, linear people" (12). But the modern "addiction to linear logic," as Joseph Brodsky terms it (46) was most powerfully addressed early in the century in T. S. Eliot's poetry: "I journeyed," Eliot wrote, "to London, to the timekept City" (*Choruses From the Rock-1934* 1. 19).

"The Love Song of J. Alfred Prufrock"(1915) and *The Waste Land* (1922) both capture the impact of linear life – the monotonous succession of events, seen in the dreary refrain of "Prufrock"'s opening: "Let us go then, you and I / When the evening is spread out against the sky" (1-2). The struggle of man against measured time ("I have measured out my life in coffee spoons" [51]) is depicted with all the lacerations of a consciousness acutely aware of other levels and times. Prufrock discovers that his life is not laid out linearly like an argument leading to a preplanned goal; rather it is caught in a web of primaconscious urges – seen most hauntingly in the mermaids' song. With his intense time-ridden sensibility and self-consciousness – "There will be time, there will be time / To prepare a face to meet the faces that you meet" (26-7), "The eyes that fix you in a formulated phrase, / And when I am formulated, sprawling on a pin" (56-7) – Prufrock anguishingly embodies his age's formal logical shapings of reality.

The Waste Land portrays a similar landscape once energized by mythic scenarios of rebirth. The opening line – "April is the cruellest month..." – harks back to the medieval vision of Chaucer's *Canterbury Tales*. In contrast to that fertile world is the modern segmented consciousness symbolized in a crowd of Londoners, moving like automata in the midst of mythic insinuations. The "violet hour" of sensuality, the "drama time" of moral choosing are reduced now to mechanical rituals. And it is only in the *Four Quartets* that the poet overcomes the oppression of linearism,

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certain "that the past has another pattern, and ceases to be a mere sequence" (*The Dry Salvages*, 86-7). Nevertheless, in "redeeming the time" Eliot does not simply look to primaconscious mythic cycles; instead salvation is found in the Christian fusion of historical and mythic times: "A people without history / Is not redeemed from time, for history is a pattern / Of timeless movements" (Little Gidding 235-7).

Eliot, then, reconceived the world in religious-moral terms while assimilating its technological structuring. Other leading modernists, like Joyce, Yeats, Pound, Picasso, and Borges went down a different, and for our thesis, a fascinating road – they reasserted the power of the labyrinth image. The labyrinth, as Guy Davenport has astutely shown in his *Geography of the Imagination* "became a life-symbol of our century" (45-60). What can we make of this resurrection of the labyrinth symbol in the twentieth century? First, the labyrinth has always been a major part of the intellectual storehouse of mankind, appearing throughout cultural history as a counterpoint to the image of line. The modern emblems of the labyrinth and the Minotaur (especially in Picasso) signify post-Romantic reenergizings of the primaconscious scenario, a recovery of the primal artist's syncretic image-making power. In such artists the line is curved back, as it were, into a labyrinthine form – into a new modernist rhetoric of "dedifferentiation." Such a rhetoric also informs post-modernist linguistic mazes, and the fusing of real and imaginary in the "magical realism" of contemporary fiction.

Earlier in the century, Yeats was a powerful pioneer force in moving against linear rationalism. In his "Trembling of the Veil," he writes of plunging "into a labyrinth of images, into that labyrinth we are warned against... 'Stoop not down to the darkly splendid world where lieth continually a faithless depth...'" (Albright 30). Of course, it is just such a plunge that Yeats takes us on in his dedifferentiating revisions of reality. In *Among Schoolchildren,* for example, wisdom is not to be found in linear teaching, wherein the children "learn to cipher and to sing; / To study reading-books and history / To cut and sew, be neat in everything / In the best modern way" (3-6). Rather, it is to be found in the plunge into visionary reveries of childish and racial memories, in the analogical imagery systems uniting body, dance and the dancer.

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The dialectic between line and labyrinth which we have briefly traced in this essay reaches, I believe, beyond literature to the very frontier of human cognition and history. In the twentieth century Los Alamos presents us an even more abstract linear logic – the countdown to atomic warfare. It is not clear who will give us the clue out of this deadly maze, but a fuller symbolic history of the line and the labyrinth may provide a thread to know ourselves better so that we may at least find our way through some of its more cunning passages.

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The Relevance of Fluid and Crystallized Intelligence Concepts to Nature–Nurture Investigation

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"Quand celui a qui l'on parle ne comprend pas, and celui qui parle ne se comprend pas, c'est de la metaphysique." I hope the rest of my paper will be more intelligible than those words, but the original flavor of Voltaire is perhaps worth preserving. He says that when neither the person who is speaking nor he who is listening really understands what they are talking about, they must be discussing metaphysics. With the recession of philosophy from the center of the curriculum the academic world, the verbally addicted found a consoling substitute in the subject of psychology. Here the secret of perpetual rhetorical emotion, in lieu of that matter-of-fact solving of problems, which other sciences seem to prefer, can still be woven into a fine art.

There are two reasons why the torrent of discussion on nature-nurture questions of intelligence cannot be replaced by a single, elegantly completed page of formulae, as a scientist would prefer. First, unlike the binomial theory or the molecular structure of insulin, the topic is not one with respect to which we have been disciplined to set aside our everyday prejudices. Secondly, there is an illusion that everyone, because his mind operates by psychological laws, must, himself, be a psychologist. An engineering student realizes well enough that before he can make the simplest bridge safe to walk on, he has to master some mathematics. How much more sophisticated and refined must be the mathematics needed to comprehend human behavior. Yet, your verbal psychologist scarcely recognizes this.

The public seems to assume, when a man of courage like Dr. Jensen (1969) states that psychology has a bearing on some public issue, that truth can be left to paper discussion, and that every man is a sufficiently qualified specialist to pass judgment on the matter. What I find depressing in these would-be free-speech proponents'

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complete lack of recognition that speech is only half, and the rougher half, of the two lane highway to truth. As a method of investigation, it suffers from being convention-bound and non-quantitative. As a method of communication, it is a prey to every source of emotional pollution. The spirit which I would like to let loose in this debate is, therefore, not "Let us stand up and debate' but "Let us sit down and calculate."

Harking back to the comment of Voltaire, let me now say that much of the debate on the inheritance of intelligence appears to me to arise from the fact that the disputants are referring to at least two different things when, because of using one word, they think they are speaking about one and the same entity. In this audience I shall assume that the general history of ability concepts is known, and that you are familiar with Spearman's multivariate operational definition of a unique general intelligence. It was my privilege to be a student of Spearman in the great days when he was hewing out this concept and the factor analytic methodology to support it. It is my embarrassment, forty years later, to be thrusting a crowbar into a flaw in this monument to reveal a somewhat different underlying structure.

The notion that Spearman's "g", really covers two distinct general structures, which I have called *fluid* and *crystallized* intelligence, goes back to an APA meeting in 1940. That, incidentally, was in the days when the APA was still a scientific society. At that meeting I presented behavioral evidence for two factors, and Hebb independently presented physiological evidence which fitted excellently the behavioral analysis. Support for the concepts and the form of these two general factors in the commonly accepted area of intelligence, i,e., in abstract thinking, problem solving, and speed of learning, has since been most systematically given by John L. Horn. Figure. 1 shows results at two age levels.

Characteristically, that which I shall henceforth designate g_c, the crystallized intelligence factor, loads the well-known primary abilities, such as verbal, numerical, spatial, and mechanical aptitudes, and others. The second general factor, g_f, fluid ability, also loads these primaries to some degree, but as Horn, Nesselroade, and others have shown, it loads most highly of all the relatively culture free performances in abstraction and relation education, which I shall illustrate in more detail later.

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TABLE 1:
The broad second-stratum ("capacity") factors in the ability realm.

Primary abilities used in correlation[a]	Fluid general intelligence	Crystallized general intelligence	Power of visualization	Retrieval capacity or general fluency	Cognitive speed
	[U.I.(T)VIII][b]	[U.I.(T)IX][b]	[U.I.(T)X][b]	[U.I.(T)XII][b]	
	g_f	g_c	g_v	g_r	g_s
Culture-Fair (Series, Matrices, etc.)	64				
Reasoning (inference)	35	38			
Reasoning (induction)	45	32			
Memory span	72				
Verbal ability		72			
Originality		82			
Assoc. fluency		33		61	
Ideational fluency				69	
Irrelevant associations				85	
Flexibility of closure	44		23		
Aiming			55		
Perceptual speed			77		
Visualization			66		
Writing speed					63
Cancellation speed					46
Backward writing					48

[a]) This sets out a reduced (purely ability) set from the full 31 variables in Horn and Catell, 1966, p. 262. For ease of scanning, all loadings below .19 have been omitted. The subjects are 480 male prison inmates of average age 28 years, sigma 10.6 years.

[b]) These are the basic reference indices henceforth used for these factors in the proposed *universal index* (U.I.) of factors in objective tests (T). Roman numerals indicate second-order factors.

If you ask in surprise why this duality was not found sooner, I can make the redundant comment that all new things are found later rather than sooner. But more pointedly, I would say that technical advances in multiple factor analysis, notably regarding communalities and number of factors to extract, had to be waited upon, and also that this definition of higher order factors in abilities could not proceed until much more was known about the

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neighboring personality factor domain. I must take a moment to expand on the last issue, because its importance in the new strategy has evidently not yet been widely understood. It evidently makes sense to some investigators to seek primary abilities by factoring cognitive variables alone. At the first order, i.e., when looking for primaries, this limitation produces no serious source of distortion; but if a second-order factoring produces a broad factor common to all primaries, there is then no means of rotating it. It is as unstable and dependent on choice of primaries as is any principal axis component. Indeed, the chief reason why the existence of more than one second-order factor has been so long overlooked is that the background material against which the distinct patterns could be visible – that is to say, what we technically call hyperplane stuff – was not added. As in many fields, we then fail to understand something because we know nothing about what stands outside it. Good experimental strategy requires that "markers" for at least half a dozen known different dimensions of personality shall still be available at the second order to permit rotation of the two or more factors that may be expected to extend themselves across *all* or most ability primaries. The next table shows what this means, and, incidentally, brings out the typical significant positive correlation that obtains between g_c and g_f. The correlation, of about 0.5, is an important fact for checking some later interpretations.

Although the main discussion turns on the duality presented by these intelligence factors, perspective requires that we glance briefly at their setting in the broader domain of what I have called the *triadic theory of ability structure*. (1989) The triadic theory recognizes three classes of structures. First, there are primary abilities which functionally may be called *agencies*, because they are the means of expression of general abilities developed within particular domains. Secondly, there are neurologically organized *powers* local to sensory and motor cortical areas, as instanced by the factors found for visualization, motor dexterity, and, presumably, auditory analysis and others. And, thirdly, there are *general capacities* running throughout cognitive performances. So far only two of the latter have been mentioned, namely, g_c and g_f, but the work of Horn, particularly, indicates an equally broad, generalized cognitive speed factor, g_s, a generalized fluency or retrieval efficiency factor, g_r, and some other general parameters of all

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cognitive action.

Higher order factorizations, i.e., of primary ability correlations, carried out with due attention to the technical requirements just mentioned are, in fact, now typically yielding four or five of these general cognitive factors. But only two of them have the character of determining those complex judgment, abstraction, and relation education proficiencies to which the term intelligence has commonly been applied since the time of Herbert Spencer and Galton. It is on these two factors that the present discussion must now concentrate.

Once the fluid and crystallized ability patterns have been factor analytically demonstrated to be separate unitary indulgences, many other differentiating characteristics accrue around them, as can be shown thereafter by experiments simpler than factor analytic ones. Among these characteristics which further confirm their distinctive natures and independent qualities are:

(1) The neurological associations pointed out by Hebb, namely, that brain injury at *any* cortical locality produces impairment in fluid general intelligence, roughly proportional to size of injury; whereas crystallized ability has its various expressions more localized, so that verbal emphasis, for example, can result from a Broca area injury without significant impairment of other localized habit skills, e.g., the spatial or numerical abilities.

(2) A striking difference in the standard deviation of the IQ such that the value calculated on fluid ability mental ages is about 50% *larger* than for crystallized intelligence.

(3) An equally striking difference in the life age curve plots, as shown in Figure 1.

(4) The fact that, in general, the tests exclusively loaded on the fluid ability factor turn out to be far more readily applicable cross culturally, while the crystallized ability subtests obviously are not.

(5) The indication that the nature-nurture variance ratio will turn out to be much higher for g_f than for g_c. Since this is a central issue in the present paper, I shall return in a moment to develop it. You will already recognize, however, that my argument is going to be that most traditional intelligence tests – like the WAIS and the WISC – are, in fact, measuring varying, and usually unknown, *mixtures* of the two intelligences. Consequently, we are saddled with disputes about the exact magnitude of the inheritance which are really as unnecessary as those which used to arise over the atomic

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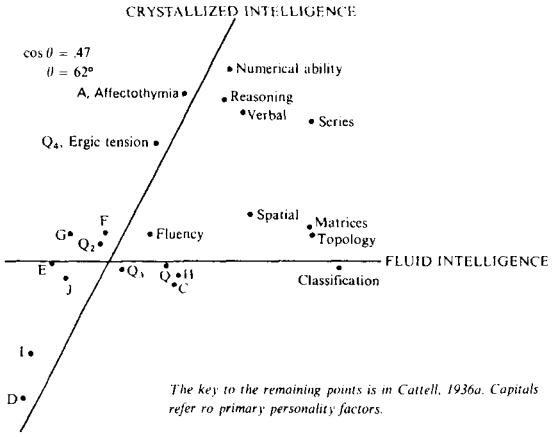
weight of helium, before it was realized that two or more different isotopes were involved in any ordinary specimen.

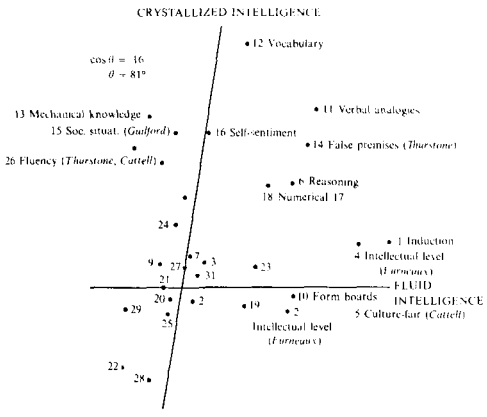
FIGURE 1, PARTS A AND B:
Plots of two age levels showing the hyperplanes determining distinct fluid and crystallized intelligence factors and their salient expressions.

(A) High school age showing the typical substantial positive correlation (r = .47; 277 thirteen to fourteen year olds)



R.B. Cattell, "Theory of fluid and crystallized intelligence: a critical experiment." *Journal of Educational Psychology*, 54, 1963, 1-22. Copyright 1963 by the American Psychological Association and reproduced by permission.

(B) Adults showing the much smaller positive correlation usually found after school years (477 lower education adults)



J. Horn and R. B. Cattell, "Age differences in fluid and crystallized intelligence." *Acta Psychologica*, 26, 1967, 107-129. Reproduced by permission of North-Holland Publishing Company, Amsterdam.

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Before turning to the specific genetic and other issues under examination here, however, let me round out the general theoretical picture regarding cognitive structure which seems best to fit the above wide range of areas of evidence and the hypothetico-deductive checking possible among them. The nature and definition of fluid intelligence is that it is a capacity for insight into complex relations accounting for that part of the test variance which seems independent of the particular sensory or cultural area in which the tests are expressed. The theory is that this capacity for relation eduction is neurologically determined, but we should note that that is not the same as saying it is wholly genetically determined. By what has been called the investment theory of the relation of fluid to crystallized intelligence, the level reached in crystallized intelligence is the combined result of the level of fluid intelligence and its developmental investment in the given areas of skillful judgment, as affected by the various teaching and learning interest conditions in the period of development. As the name for g_c indicates, the judgmental capacities have become crystallized and recorded in skills in the given areas. This investment theory is graphically shown in the next figure 2. Incidentally, a study of this model will show why crystallized intelligence is *still* something different from average scholastic achievement.

The causal connections in this investment model explain why a correlation of about +0.5 would be expected, as shown in the second table, between g_f and g_c. However, what more basically needs explaining is the reason for g_c having the loading patterns of a general factor distinct from that of g_f. The existence of a usefully predictive general factor among such measures as vocabulary, mathematical ability, etc., that is, of a single factor with sufficient unity of common variance to be valid for predicting many criteria, can be explained, I believe, only by supposing two cooperating effects. First, some common variance is produced in these scholastic kinds of judgment by their all being peculiarly susceptible to advancement by investment of the existing common fluid ability factor in them. Secondly, a similar tendency to common advance or retardation in all of them is induced by their being the common core of the teaching curricula of schools. Any individual gets either a smaller or greater dose of learning *simultaneously* in all of these intellectual skills. Both sources of common variance are needed to give substantial unitary character to the g_c

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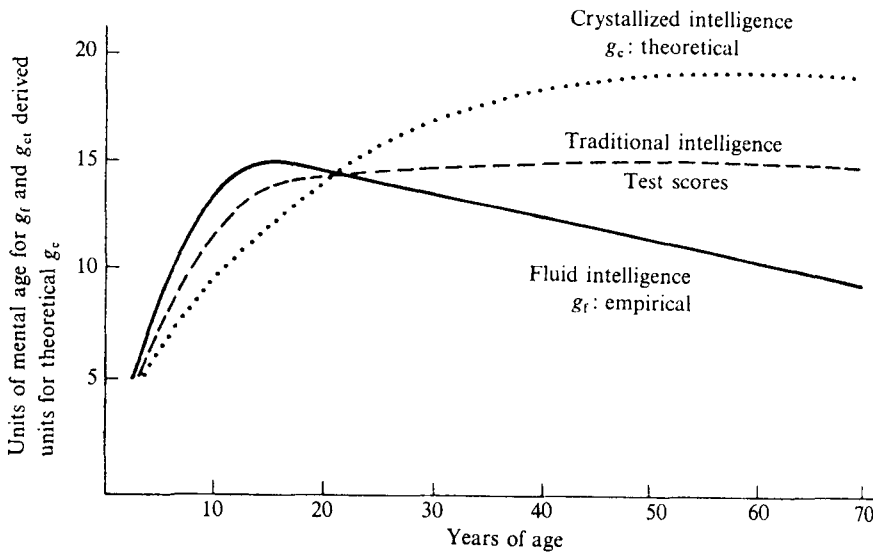
factor. Consequently, it is not surprising that when the second ingredient is absent – as in the correlations with children from different cultures, or in the use of traditional tests with middle-aged adults from very different occupations – the power of g_c, as a *general* factor and, therefore, its practical utility as a measure of intelligence, begin to decline.

FIGURE 2

Derivation of phenotypic from genotypic maturatikonal process illustrated by investment theory of fluid into crystallized intelligence. Age: 5, 15, 25, 35, 45, 55, 65, 75; g_f values: 9, 15, 14, 13, 12, 11, 10, 9; g_c values: 6.7, 13.0, 16.2, 17.9, 18.8, 19.3, 19.5, 19.6; g_{ct} traditional intelligence test curve follows general argument of Baltes and Schaie (1974).



Those who wish to pursue further the evidence of this theory in itself can best do so in my recent book on *The Prediction of Achievement and Creativity* (1988) and in *Intelligence, its Structure, Growth and Action* (1987), but in the remaining space here I should, perhaps, extend discussion to avert some misunderstandings that

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might arise in the use of these concepts in their main applications in the present area. The first bone of contention concerns the practicability of developing *culture fair* or, at least, *culture reduced* tests of intelligence. These are needed for making individual and group comparisons of intelligence, i.e., of learning potential, despite the compared individuals or groups differing in major ways in their culture or sub-culture. The claim in my own IPAT Culture Fair tests (1950) or in Raven's matrices (1947) to have produced a relatively culture fair test has been curtly dismissed by some writers for the press with the assurance to their readers that it simply "cannot be done." Their reaction is precisely on a par with that of the old lady who, seeing a giraffe, indignantly remarked, "I don't believe it," or with those newspaper editorials in 1903 which assured their readers that the Wright brothers' plane could never be anything but a toy. For, in actual try-outs, the culture fair test has met most of the requirements that could be demanded of it, namely, that it be capable of getting *equal* scores in people of remotely different cultures, but also of yielding unequal scores in people of the same culture. To be a good intelligence test, its subtests must also load the general cognitive ability factor highly, and that general factor criterion in this case should clearly be g_f. Obviously, no simple comparisons of intelligence could be made of the scores on the two different g_c factors, each from a different culture. Those required substantial loadings on the general factor of g_f have been found in the Culture Fair scales as given to subjects in several different cultures. (Raven's matrices are less clear because they have the defect of measuring a factor by a single subtest.)

But what is the principle by which the cultural content is to be reduced or eliminated in subtest construction? *A priori* there are two theoretically acceptable ways of getting rid of test variance due to culture: (1) to couch the relation eduction processes in fundaments, i.e., perceived elements, that are *equally strange* to the cultures to be compared, and (2) to couch them in fundaments that are so overlearnt and *equally familiar* that there is no variance left among the groups in g_c in regard to their perception. The approach which Line, Raven, and I started in the early thirties put its money on the latter approach. My initial approach was to set up relation eduction problems among parts of the human body, celestial objects – sun, moon, stars – earth, and water, etc., judging

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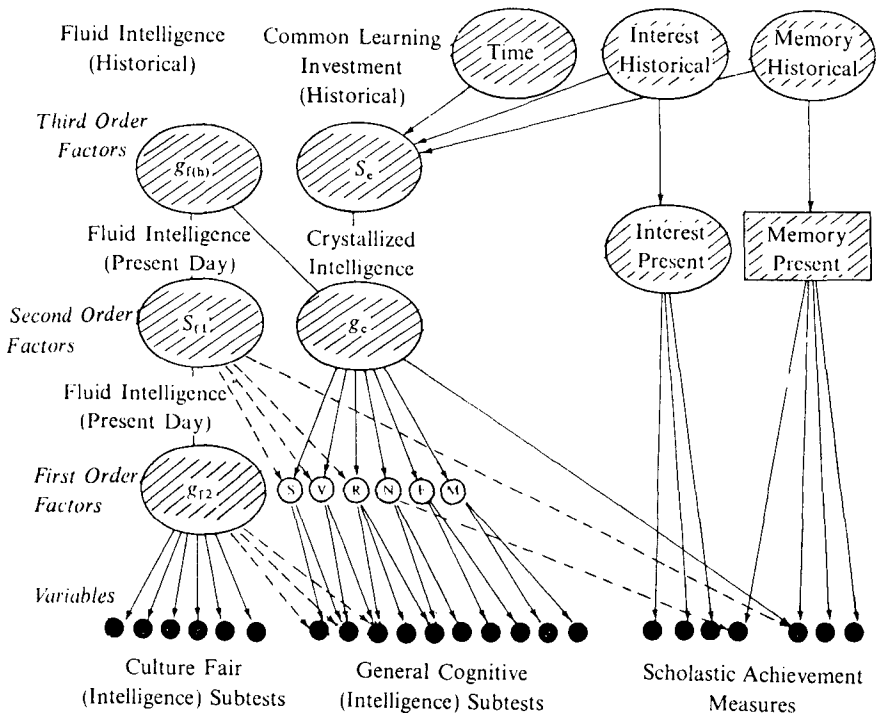
these common things to be universally recognizable. However, a more complete escape from cultural associations soon suggested itself in perceptual tests of the kind shown in Figure 4 and they proved more satisfactory in reaching g_f than any others.

FIGURE 3

Hypothesized causal action in the investment theory.



The inductive, experimental, factor analytic approach leads from the structure found in such behavior to a definition of intelligence as *the capacity to perceive relationships*. It is this which underlies and is the common feature in such definitions as the ability to think abstractly, the ability to learn, and high adaptability

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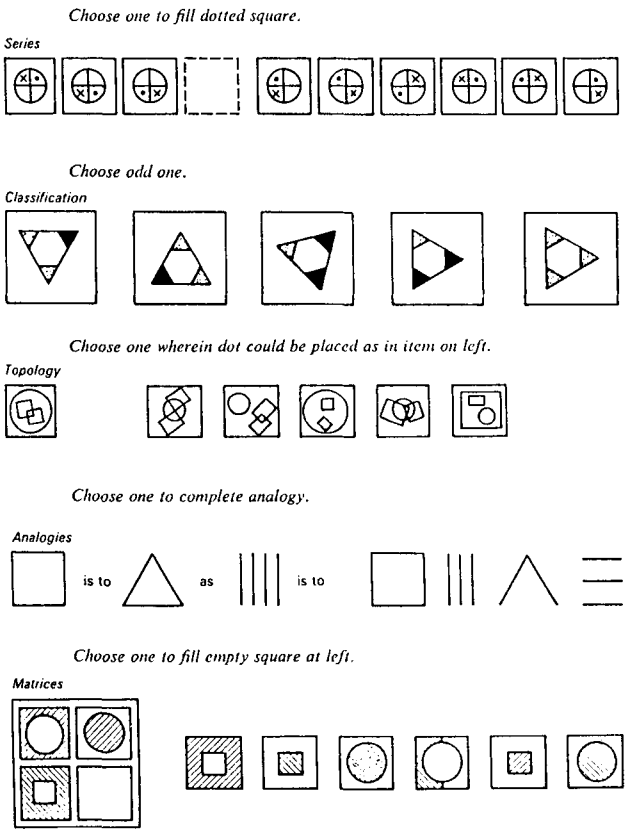
in problem solving. Except for such restrictions as will be obvious from the triadic theory, it should not matter, by such a definition, among what types of fundaments the relations are demanded. The complexity level must, of course, be appropriate, for, at each higher level and sigma of g_f, the general factor will shift its highest loading to performances of enhanced complexity of cognitive operation.

FIGURE 4
Examples of five culture-fair perceptual, relation-eduction subtests of proven validity for fluid intelligence



From Form B, Scales II and III, IPAT Culture-Fair Test. By kind permission of the Institute of Personality and Ability Testing, Box 188, Champaign, Illinois. *Analogix* section from Cattell Scale II, Harrap & Co.

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But, so far, it has not been impossible to design, out of the culture fair type of fundaments items, the required level of intellectual complexity to factor systematically load the general factor well. Moreover, the verdict of the factor structure is that we are still not running into any specificity, such as a purely spatial ability. Indeed, tests of this perceptual kind typically have the highest loading on the fluid general intelligence factor. Additionally, however, one finds high g_f loaded subtests in other material, even in verbal analogies, if the words involved in the complex relations are, themselves, very simple and well known. Also, it seems that tests of short distance memory span, as Jensen and Horn have used, and the Furneaux letter series as used by Horn (1968) are of high validity for g_f.

TABLE 2

(ii) More traditional test (the WAIS)[c]

Subtest	Loading on a_s	Subtest	Loading on a_w
Information	83	Digit Symbol	65
Comprehension	72	P. Completion	75
Arithmetic	71	Block design	70
Similarities	77	P. Arrangement	70
Digit span	62	O. Assembly	64
Vocabulary	83		

[c] J. Cohen, "The Factorial Structure of the WAIS between Early Childhood and Old Age," *Journal of Consulting Psychology*, 121, 1957, 283–290. Copyright 1957 by the American Psychological Association, and reproduced by permission.

(iii) Cross-cultural concrete validation

(a) Equality of score across racio-cultural groups

Test		Chinese	Taiwanese	American
Culture Fair B	Mean	27.33	26.69	27.00
	Standard Deviation	4.53	4.47	4.50

Nowhere among these raw scores do differences approach statistical significance.

(b) Similarity of predictive power across groups[d]

Language	Chinese	.30	*Math*	Chinese School	.47
	English	.40		American School	.64

[d] Prediction from same Culture Fair Scale of Student Achievement in U.S. and China.

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I have just said that a culture fair intelligence test, by definition, has to satisfy two conditions: That it is an intelligence test and that the performances in it are not significantly affected by culture. The first, it has been pointed out, is evaluated by determining the test's saturation with the general factor and by its power to predict various life criteria. There is no question that the CF type of test meets these validity requirements, as well as does a traditional test. For it correlates highly with the latter when used in their own *uniform* cultural groups; it predicts general achievement; it predicts rate of learning, for example, of Italian or Chinese, among Italians or Chinese, at about the same significant positive value as it does the learning of English in America or Britain.

But how well does it meet the second criterion of being "culture fair"? By now the same culture fair tests, with classification, analogies, series, and topology subtests, have been given, outside of English speaking countries, in France, Germany, Italy, Mexico, India, the Congo, Japan, and China (1987). The means and sigmas in most of these are almost indistinguishable. To take a remote pair of cultures – the midwestern high school and the Chinese speaking and writing high school of Taiwan – we find absolutely no evidence of any significant difference of mean or sigma between them. (See Table 4) However, one must distinguish, of course, between *culture fairness*, on the one hand, and insusceptibility to *test sophistication* effects, on the other. On any test, whether of g_f or g_c, subjects show improvement of performance with repetition, i.e., through test sophistication. (Vernon 1979) This appears, for example, in the last table between the first and second administration. Sophistication is nothing more than "getting used to the game," and studies show we should ideally re-administer the equivalent forms of a test four or five times before considering results comparable across groups previously ranging in test experience.

This evaluation does not conclude that there is not still room for improvements in culture fair tests, and Professors Horn and Anderson are hotly pursuing them. For example, it seems desirable that the fundaments should not only be non-verbal and non-pictorial, but should not even possess names. There is also the possibility that even with the culture fair material, there may be cultural differences in natural tempo of working and in gain from motivation, as shown by Butcher and myself in *The Prediction of*

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Achievement and Creativity (1968); indeed, a whole technology of separation of motivation, ability, and personality exists. In any given performance experiment is now in the making. In short, when the unbelieving anthropologist says there is no such thing as a culture fair intelligence test or a culture fair test of basic metabolism, or any other human endowment, he is only making an equivalent to the obvious remark that there is no such thing as a "pure water" supply. The real question is "Does our drinking supply depart sufficiently from 100% H_2O to matter, and can a chemist, using it in experiments, allow accurately for the impurities known to be in it."

In this connection I cannot help observing that it is those who lean in explanations to the environmental extreme rather than the genetic extreme who have shown a tendency to be woolly and imprecise about ability concepts and their methodological foundations. They are too quick to say, without adequate examination of the current status of straight ability research, that they have no use for the concept of intelligence or that they see no meaning in a primary ability, and so on. Hunt, for example, has said that he can see no foundation for any idea of innate learning potential, and others have multiplied the usual difficulties of conceptualization in psychology, retreating to a boundless jungle of particularism rather than constructively seeking a present best-fitting theory. Indeed, none but the most simple-minded can look at the present scene without surmising that this conceptual nihilism is part of an emotional scorched earth policy in the face of the advances made by genetics in the last decade.

I think I can reliably state that my own interest has been in the structure of abilities *per se* rather than in what the nature-nurture debates eventually make of them, and I, frankly, resent any policy of obscurantism in regard to the developmental and structural concepts that are now tentatively, but illuminatingly, appearing in the ability field. Nor do I think the recent pronouncements of SPSSI on Dr. Jensen's paper are anything for an alleged scientific society to be proud of. They state that (quote) "An accurate understanding of the contribution of heredity to intelligence will be possible only when social conditions for all races are equal and when this situation has existed for several generations." In brief, the question can be answered only when impossible conditions are met, wherein the answer would be so obvious that scientific analysis

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and experimental ingenuity would be superfluous. One is reminded of those critics of Copernicus who pointed out that the question of whether the earth or the sun is the center of the solar system would be answerable only when human beings could be transported to make observations from both vantage points. To paraphrase Dr. Johnson's well known dictum on the virtue of patriotism, I am beginning to suspect the virtue of theoretical criticism, and that "scientific caution is the last refuge of an intellectual nihilist."

In thus re-affirming that we possess an equipment of effective scientific concepts in the ability area, and possibilities of meaningful cross cultural measurement which have yet to be disproved, let no one suppose that I am setting out to beg or bias the question of the nature-nurture ratio for fluid intelligence. It happens that evidence on nature-nurture ratio for fluid intelligence measures is extremely scarce. Indeed, the only data I know of is that fathered by Kristy, Stice, and myself with the Multiple Abstract Variance Analysis method. Although I believe the MAVA method (Cattell, 1982), must supersede the twin method, and although we worked with 500 sibs and twins to augment the results, this first use of the method was clumsy, and I do not consider the results exact. They indicated, however, a greater hereditary variance for g_f than the 80% commonly found with traditional intelligence tests. But by no allowances, nevertheless, could the results justify calling the g_f measure a measure of purely innate intelligence. However, since environmentalists have a one-track tendency to equate environment with education, let me state my guess that the 15% or so of environmentally determined variance indicated for g_f will turn out to be largely associated with the degrees of brain injury to which we are all subject from early conception onward. At least, let us, in our investigations give equal attention to educators and to physiological effects from childbirth accidents, childhood fevers, arteriosclerosis, anaesthetic accidents, and even simple blows on the head, such as the jousting accident which some historians think accounts for the sudden change in intelligence in the policies of Henry the VIII after his 40th year. However you wish to cut the pie of variance within environment, the sum total of what you have to play with is that given by the twin or MAVA variance analysis result for environment, and what importance you assign to school, to health, to home culture has to be contained within that 80 to 85%.

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With respect to any discussion of genetic and environmental variance interactions, the upshot of my paper should be clear, namely, that only confusion will result unless the values are separately determined with respect to the duality of concepts presented by fluid and crystallized intelligence. The importance of alertness to this difference has already been indicated at a practical level by a finding to which all too little attention has been given. I refer to the astonishing difference between Dr. Tuddenham's results and my own on the inter-generation trend in intelligence test scores. Dr. Tuddenham's results, showing that the average intelligence score increased in the early part of this century, on traditional intelligence tests, are well supported by those of Finch (1940) and others. The Scottish Council Survey results of Godfrey Thomson are closer in outcome to my own. The latter actually offers the only study in which culture fair tests were used. Therein I tested ten year olds in all schools of the large English city of Leicester and re-tested again after thirteen years. It showed no trace of any significant drift at that time.

Although there is less doubt about the equivalence (social and general) of my ten year olds than of Tuddenham's draftees in the two wars, I see no reason to doubt the direction of shift he found. The large shifts on the traditional tests, which Finch attributed to a steady improving school system and length of schooling, shows in the first place that a culture fair test is needed if cross cultural comparisons are to be made across the gaps of history as much as those of geography. The standardization of a crystallized intelligence test is erroneous from the first day, drifting on cultural tides. But the Leicester experiment also suggests that the environmental contribution from physiological experiences may not be showing the same secular trend as that from schooling. Since it is some millions of years from Australopithecus, through Neanderthal, and Cro-Magnon man up to the present, it should, perhaps, not surprise us that of g_f change study reveals no change by our instruments in a generation.

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Academic Achievement in High School of Blacks and Whites: A Retrospective Study of Freshman College Students Who Would Not Have Been Admitted Without Open Admissions

Russell Eisenman
McNeese State University

The high school achievement of black and white freshman college students was analyzed in terms of whether they had slightly better than a C average, were in the upper half of their graduating class, or scored a minimum of 18, the national average, on the American College Testing Program test (ACT). Those who failed on all three criteria would not have been admitted under proposed university standards, which were suggested to replace the open admissions standards. Of the 487 freshmen admitted, 102 failed on all three criteria, and blacks were overrepresented in this group by a 2-to-1 ratio. Thus, the proposed new non-open admissions standards would have eliminated 68 blacks and 34 whites from college admission at this school. Reasons for low black achievement are discussed.

When a university in the Southern part of the United States proposed, via the faculty senate, that their open admissions policy be abandoned in favor of having admissions standards, it provided the opportunity to see if there are racial differences in who would and would not have been admitted under the proposed new policy. Open admissions means that any student who applies is admitted, although many colleges practice a modification, such as requiring a high school degree from an accredited high school. The open admissions policy reflects a desire to be nondiscriminatory and provide educational opportunities at the university level for all, regardless of their ability as revealed via achievement test or high school grades. Also, many universities have turned to open admissions out of economic needs, to get an adequate student body, given the decrease in applications that many colleges have faced, due to demographic trends, e. g., a decrease in college age people in the nation.

Many studies have shown that blacks tend to perform poorer

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than whites on a variety of measures of intelligence or achievement (Eysenck, 1971, 1984, 1990, 1991; Jensen, 1972; Levin, 1990, 1991; Shuey, 1976). Also, blacks are more likely than whites to be diagnosed as needing special education classes or to be seen as having mild mental retardation (Reschly & Ward, 1991). On the other hand, critics point to environmental factors which they say discriminate against blacks and attribute the above type findings to social causes, not inherent qualities of blacks (Brantfinger, 1991; Kozol, 1991).

The present study provides insight on both black vs. white achievement on an achievement test, the American College Testing Program (1990), which is commonly known as the ACT and is usually required for prospective college students in the southern and midwestern United States, as well as actual high school achievement, by considering whether the student was in the top half of the graduating class or earned at least a 2.3 grade point average, which would be a little better than a straight C average, which would be 2.0. Thus, even if the ACT test discriminates against blacks, the black high school students had the chance to show their ability by graduating in the top half of their high school class or obtaining at least a 2.3 grade point average. The student can show strength via an achievement test score, via grades, or by graduating in the upper half of the class.

Method Subjects

The subjects were the freshman class of 487, which represents all the students admitted to the university in the Fall 1991 academic year.

Procedure

The students were analyzed by race, black vs. white, in terms of whether the new proposed admissions standards would have eliminated them from admission. The proposed standards were that the student had to have achieved any one of the following three things while in high school: 1. have a 2.3 grade point average (slightly better than a C average which would be 2.0); 2. be in the upper half, in grades, of the graduating class; 3. score at least 18, the national average, on the American College Testing Program (1990), which is known as the ACT.

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Results and Discussion

There were 102 freshmen students at this university who would not have been admitted had the new standards been in effect. Breaking down these students by race, 68 were black and 34 were white (p .01, two-tailed binomial test).

The results are consistent with the generally poor achievement of blacks in a variety of test areas. However, it was not simply on a test, in this case the ACT, that the blacks performed poorly. They also failed to demonstrate good academic achievement in grades and final class standing. Thus, an argument that the ACT discriminates against minorities would not be adequate to account for the present findings.

If open admissions are abandoned at this university, blacks will be rejected at a 2-to-1 ratio over whites, according to the present results. What accounts for this? One could take an environmental or heredity stance to account for the findings, and either viewpoint would be consistent with the present findings. For example, for whatever reason, blacks males, at least in part due to pressure from parents and peers, engage in early heterosexual behavior (Simmons, Black, & Zhou, 1991) and this could be counterproductive to good academic achievement. Attention to homework can facilitate achievement in high school, especially when the parents assist (Miller & Kelley, 1991) and many blacks, especially those from the lower socioeconomic classes, may not even have both parents at home, much less parents who can assist them with homework. Socioeconomic status is an important predictor of school success and a disproportionate percentage of blacks come from the bottom socioeconomic classes, and thus should be expected to do poorly in school (Dornbusch, Ritter, & Steinberg, 1991).

In my classes, I found that blacks would sometimes fail to answer test items when they seemed to know the answer (Eisenman, 1991a, 1991b). That is, in giving make-up exams to students who had missed the regular exam, I found that if coached slightly, such as by saying "What do you know about reinforcement? O. K., now what do you know about negative reinforcement?", black students could often give correct answers, but would not without this prodding. This suggests that methods to improve school performance of blacks may be successful if we can find the correct procedures.

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Of course, not all blacks do poorly. Our language system makes it difficult to make clear that when we talk of, say, "poor black performance" we are speaking in probability terms and do not mean to include all blacks. However, the results of the present study show that some blacks do very poorly in high school, and will be eliminated from college if schools apply certain prerequisites for admission. This would seem to be a pressing social problem, regardless of what one sees as the causes for such poor performance.

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Ancient Eugenics

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Late of Keble College, Oxford

The preface to a history of eugenics is most probably to be found in the paleolithic, for the first eugenist was not the Spartan legislator, but the earliest hominid who killed the critically impaired child. The lower the economic level of the community, the more rapidly it reproduces itself. There is an extravagant production of raw material, and the way of Nature is the ruthless rejection of all that is superfluous. When there is no differential birth-rate, nature adjusts the balance by means of a differential death-rate. In the days when human or animal foe threatened on every side, when "force and fraud were the two cardinal virtues," the life of man was "poor, nasty, brutish, and short." Natural selection was both ruthless and severe. Eventually, some conception of the wasteful processes of Nature at some time dawned upon the increasingly intelligent human mind. While they lived their short lives, the weakly, the deformed, and the superfluous were a burden to the band. Human custom, superseding natural law, would be tempted to eliminate them at birth. This was the atavistic basis on which subsequent eugenics was built.

In Greece, however, primitive eugenic practices underwent a logical development. It was recognized that the occurrence of the non-viable child was inevitable, and remedial custom and subsequent legislation essayed by anticipation to reduce this waste of life to a minimum. It was realized that to increase the productivity of the best stock is a more important measure than to repress the productivity of the worst. Out of the negative aspect of eugenics develops the positive.

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† This original study, based upon classical literature and therefore still current, has been shortened and abridged by Alan McGregor for inclusion in this issue of *The Mankind Quarterly*.

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Speculation on Earliest Days

With the advance of civilization, conditions became increasingly stable: war is still imminent, but, instead of being an essential element of existence, it comes to be regarded as a necessary evil. Eugenic measures are still necessary, but in the altered conditions a new ideal is born. The conception of a race of competent warriors develops into the ideal of a state of healthy citizens. All these formulations of eugenics are aristocratic and parochial; they are to benefit the people of a single state, and only a section within that state. Any wider conception of broad eugenic regeneration was impossible to a people who dichotomized the state into free citizens and slaves who were devoid of legal status.

Thus the earliest elements of eugenics are to be found in the attempt of early men to combat the wasteful processes of nature by eliminating the non-viable at birth. Modern efforts, on the contrary, have been directed to the prolongation of the lives of the non-viable. Instead of sacrificing the unfit in the interests of the fit, we employ every resource of modern science, in the words of one early eugenicist, "to keep alight the feeble flame of life in the baseborn child of a degenerate parent."[1]

The weapons forged by nature have been taken from her hands. Side by side with the rapid multiplication of the unfit there has been a marked decline in the birth-rate of the creative and productive elements of the community.

In the second place, the abolition of infanticide has confronted us with the necessity of knowledge. The methods of the animal breeder are ruthless and precise. He slaughters or he spares, and divergent variations are a matter of no moment. So the Spartans and Plato, with this analogy before them, were saved from the necessity of any deeper knowledge by the preventive check of infanticide. If Nature erred in her intentions, this art was at hand to rectify her mistakes. Infanticide saved the Greeks from many of the problems of defective heredity.

When concerned with the question of eugenics, there is the problem of selection. Though physique is easily estimated, and correlated, perhaps, as Galton held, with other good qualities, the modern eugenicist has before him no simple homogeneous ideal. He has to recognize the psychical as well as the physical aspect of

[1] Tregold, "Eugenics and Future Progress of Man."

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the intricate mosaic of human personality. The altruistic claim their place no less than those of brilliant intellect such as a Marcus Aurelius or an Adam Bede.[2] Even though we hold it possible to compile a list of qualities for selection universally acceptable, we cannot, under the present limitations of our knowledge, prove personal value to be synonymous with reproductive value. No schema of economic eugenics, inferring the aptitudes of individuals from social position or income, can solve the hopeless perplexities that wait upon constructive methods. Passing from the individual ethnic group to the panorama of diverse world populations, eugenic theory is confronted by the conflicting ideals not only of alternative characters, but also of incompatible cultural values, themselves often reflecting differences in heritable personality. Since differentiation is an indispensable factor in human progress, there thus arises the further problem of a eugenic ethnology.

In this we find the roots of the opposition that has grown up in modern times to eugenic theory. Lost in egotism, eugenics has also met with opposition arising from misguided and imprudent altruism. Only scientific altruism renders it once more practicable.

Early Infanticide

To return to our theme, from the early origins of primitive eugenic practice in the unreflective intuition of the atavistic past, eugenic theory became an increasingly conscious practice among the Greeks until it finally flowered in the pages of Aristotle, only to become lost from view amid the throes of a pessimistic and decadent age that followed the collapse of the golden age of Greece.

Infanticide and exposure, terms which in early ages were virtually synonymous, appear on first consideration to have been practiced among uncivilized tribes for a bewildering multiplicity of reasons.[3] There is the female infanticide of China and the Isles of the Southern Pacific, the male infanticide of the Abipones of Paraguay. There are the Carthaginians who sacrificed their children to Kronos, the Mexicans to the rain god. There is the murder of twins and albinos in Arebo, and the cannibalism of the aborigines.

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[2] Galton, "Essays in Eugenics," p. 36.

[3] McLennan, "Studies in Ancient History," chap. vii., *passim*.

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Co-existing with all these various practices there is the definitely eugenic motive. Among the aborigines, deformed children were killed as soon as born. The natives of Guiana killed any child that was "deformed, feeble, or bothersome." The Fans killed sickly children.

The question arises, therefore, whether the eugenic motive first led to the institution of infanticide, or whether it was merely a by-product, a later growth, springing out of a practice which owed its inception to totally different causes. Setting aside infanticide when prompted by mere brutality or cannibalistic cravings, the motives may be classified as irrational or rational.

Irrational motives are the religious or superstitious, rational the eugenic. Between these two there is a wide line of demarcation.

The origin of religious infanticide is obscure. There may be in it something of a sacramental meal, or possibly the primal idea in its many variations is the gain of some benefit by the sacrifice of something of value. In any case, whatever the basic intention, the religious motive in infanticide has no relation to the eugenic. Such melancholy theology implies some degree of social organization, and was, therefore, a later and independent conception.

Even before man became his own worst enemy, brute creation must have furnished formidable foes to the naked and defenseless savage. Under pressure of want, the group must adjust their numbers to the available food; under pressure of war, the same problem rises in still more urgent form. From these circumstances arises the practice of infanticide. It is circumstance, says Plato, and not man, which makes the laws.[4]

The nomadic group, passing from district to district in search of food, would find the children a burden. The earliest infanticides, casual rather than premeditated, were probably in the nature of a desertion. This preparing the way for an extension of the practice would lead to its adoption in the attempt to adjust numbers to the available food-supply. In the same way non-producers and non-combatants would be regarded in the nature of impedimenta, since they consumed food without benefiting the group in return.

The first system of infanticide is therefore a policy of immediate need. The first victims would probably be infants who were

[4]"Laws," 709.

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severely deformed, the maimed, and the weaklings, and female infanticide might also follow. We have evidence of Neanderthal adults who were cared for by their compatriots even though by accident they had suffered crippling handicaps. But newborn infants have not yet been emotionally integrated into the group.

Infanticide in the Classical World

Infanticide, sanctioned by long usage, eventually passed into the custom, and subsequently into the laws of several civilized nations. It appears in the legislation of Solon,[5] while at Rome it was ordained by the Twelve Tables for a definitely eugenic motive. A child conspicuously deformed was to be immediately destroyed.[6] But this limitation was frustrated by the control conceded to the father, which power, restricted in Greece by all legislators alike, was absolute in Rome as in Gaul.[7]

So at Rome the eugenic motive fades into the background, and abuses become so frequent that they have to be checked by further legislation. Romulus is said to have forbidden the murder of sons and first-born daughters,[8] and the "Lex Gentilicia" of the Fabii, who were in danger of extinction, decreed that every child born must be reared.

Under the Empire we find Seneca asserting once more the eugenic justification of infanticide. "We drown the weakling and the monstrosity. It is not passion, but reason, to separate the useless from the fit."[9] Two distinct tendencies appear, control of reproduction diminishing infanticide among the upper classes, exposure taking its place among the lower.

The lower classes, on the contrary, propagating recklessly amid extreme pauperism – for rapid multiplication was then as now a frequent concomitant of bad environment – resorted to unselective exposure, which is the antithesis of eugenic infanticide.

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[5]According to Sext. Empericus (Pyrrhon., "Hypot.," iii. 24), Solon conceded to the father the power of killing his children. Taken in conjunction with the limitation of the patria potestas, this appears improbable. According to Plutarch (Solon, xxii.), he sanctioned the exposure of natural children.

[6]"Insignis ad deformatem" (Cic., "De Leg.," iii. 8).

[7]Cæs., "De Bell. Gall.," vi. 19.

[8]Dionysius, ii. 28.

[9]"De Ira," i. 18.

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Quintilian, indeed, declared that the exposed rarely survived,[10] but the possibilities of acquiring a free slave by saving an abandoned infant must have led to frequent preservation – "vel ad lupanar vel ad servitutem."[11] Occasionally the luckless child falls into the hands of unscrupulous mendicants, who maim it and exhibit it for gain.[12]

So the Christian Councils and the Christian Emperors set themselves vehemently to oppose the practice, but, using palliation instead of prevention, relieved the world of one problem and left another in its place. Despite the legislation of Constantine, Valentinian, and Justinian, exposure continued. Marble vessels were set up at the doors of the churches, and gradually there came into being hospitals, asylums, refuges, créches, receiving and tending the blind, the deaf, the dumb, the crippled, and defective, regardless of whether these were congenitally handicapped or the unhappy products of accident or disease. Out of the failure of the Christian Fathers to find the right solution to a difficult problem arose what late nineteenth century eugenists perceived as an imperative need for the scientific altruism of eugenics practices.

Beyond infanticide, which, despite its many perversions, was in part eugenic, the Romans made no conscious effort to build a scheme of racial regeneration. Whatever the appeal of "patient Lacedæmon" to the sentimental vulgarity of the Romans, they learnt no lesson from their admiration, though the biographer of Lycurgus lectured to Domitian. In the crude scheme of the Germans, Tacitus finds no eugenic moral.

Restrictive marriage, perhaps, would have been a perilous lesson to teach to the Caesars, who, from Julius the epileptic to Nero the madman, may have suffered from hereditary insanity. Pliny's boast that for 600 years Rome had known no doctors shows that there was little interest among the Romans in schemes of hygiene or social reform. The Greeks themselves had forgotten, by the time they came under Roman domination, the teaching of Plato and Aristotle. Eugenics was lost in Stoicism, and Stoicism was the creed of the Empire.

"This age is worse than the previous age, and our father will

[10]"Dec., ccvi. 6.
[11]Lact., "De Vero Cultu.," lib. vi.
[12]Seneca, "Controv.," v. 33.

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beget worse offspring still," declared Horace; and Aratus voices again the lament of Horace: "What an age the golden sires have left behind them, and your children will be worse even than you!"[13] The Golden Age of Rome lay forever in the past.

Legislated Eugenics

In Greece, the theory underwent a logical development. State-controlled infanticide passes into a definite scheme of negative eugenics. The negative aspect, giving rise to the positive, fades into the background, and is retained merely as a check on the imperfections of a constructive scheme.

The systematized infanticide of Sparta, so far from being a recrudescence to atavism, is an advance towards civilization. A custom which had been so deeply implanted in the race by ages of barbarism, and had resisted for centuries the incessant pressure of the Christian Fathers at Rome, would not easily have been uprooted in Greece. To supersede the reckless and capricious brutality of individuals by state infanticide on a definite basis was an essential gain to humanity.

The destiny of the new-born child is no longer decreed in the privacy of the home; it is brought instead into the Council Hall before the Elders of the tribe. If well set up and strong, the child is to be reared; otherwise, doomed as useless, it is cast into the fateful chasm on the slopes of Mount Taygetus, for they hold that "it was better for the child and the city that one not born from the beginning to comeliness and strength should not live."[14]

Selective infanticide could only rest on a physical basis; there was no speculation in latent capacity. There was no list of unhealthy geniuses in the annals of Sparta, no St. Paul, no Mohammed, no Schumann, no De Quincey. Even if selection had been less rigorous, and physically handicapped genius had been conceded the right to live, environment would frequently have denied it the right to develop. Sparta, content that Athens should be the *Kulturstaat* of Greece, cared only that the military hegemony should be her unchallenged right.

Once infanticide had become a system, its recognition as a *pis aller* would suggest regulation of marriage. By retention of

[13]"Phenom.," 123-124.
[14]Plut., "Lyc.," 16.

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infanticide as ancillary to the constructive scheme of eugenics, the anomalies of heredity admitted of a simple and ruthless solution.

Positive eugenics, not only in the past, but also today, is based on the analogy of animal breeding. The Spartans were the first to realize the inconsistency of improving the breed of their dogs and horses, and leaving to human kind the reckless propagation of the mentally defective, the diseased, and the unfit.[15]

The use of analogy presents many pitfalls to be surmounted, and it is easy to see the absurdity of any conception of eugenics as a sort of higher cattle-breeding. Full experimental control is not possible with man as it is with animals and plants. The analogy, literally accepted, would require a race of supermen, or some outside scientific authority manipulating a lower stock for its own advantage. Human eugenics, to be effective, can never be purely voluntary, unless it results from a new ethical sense of the individual's relation to the social group.

In the second place, the whole world of spiritual motives lies outside the province of the breeder. He is faced with no problem of differentiation. With a clear and homogeneous ideal before him, he sets himself to its attainment, killing and preserving with simple and ruthless precision. The Spartan system was a more lofty spiritualization. There was no cold-blooded selection of partners, no interference with sexual attraction, no interference with human emotions. The Spartans, within these limits, were unfettered in their choice of brides, but were punished for abuse of the liberty conceded them. There was a penalty appointed for celibacy, a penalty for late marriage, but the third and the greatest penalty was for a bad marriage.[16]

A further concession, the privilege only of the worthy, is seen in the compliances permitted on the part of the wife, that she might produce children for the state. So far from this practice being a recrudescence to the habits of the early savage,[17] or an instance of an Aryan custom akin to the Hebrew Levirate,[18] it seems obvious that it was a eugenic measure suggested by the analogy of the breeder.[19] Thus, within eugenic limits considerable

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[15]*Ibid.*, xv. 25.
[16]Stobæus, lxvii. 16. *Vide* Plut., "Lysand.fin.," p. 451*ab*.
[17]Barker, "Political Thought of Plato and Aristotle," p. 153.
[18]Mahaffy, "Greek Literature," vol. ii., part 2, p. 68.
[19]Plut., "Lyc.," xv. 30.

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play was conceded to human personality.

It is true that the bearing of children was regarded as the essential function of women, and this view, though biologically justified, seems to ignore that other aspect of marriage – mutual assistance and companionship.[20] But even in democratic Athens the ideal of a Nausicaa, Penelope, or Andromache, had been superseded long since by a conception of wives which regarded them as of little more than procreative importance. Love marriages and genuine affection were more common in Sparta than in Athens. The conduct of Agesistrata and Kratesickleia[21] on the death of their husbands, though it is evidence at a later date, shows traces of genuine feeling. In this respect, therefore, the Spartan practice was not remote from modern ideals, but infanticide, eliminating the unfit at birth, offered a solution of the problem which we can only hope to solve by the scientific application of the principles of heredity.

In Ancient Sparta

The Spartan method of breeding avoided the pitfalls of analogy; their aim implied a literal acceptance. The modern problem is the selection of qualities on a basis broad enough to represent the many qualities that distinguish individuals and nations, the problem of a eugenic ethnology. The Spartans, like the breeder of animals, bred for a single quality, and a single uniform type. Setting life on a physical basis, regarding bodily efficiency as the only quality of use to a military brotherhood, they pursued their aim with the ruthless precision of the breeder. It was a narrow and egotistical aim, but consistent with a constructive scheme of eugenics which can only be maintained by eliminating undesired elements at birth.

At the same time the selection of racial physique as a criterion has certain obvious advantages. To the Greeks, believing only in the beauty of the spirit when reflected in the beauty of the flesh, the good body was the necessary correlation of the good soul. Though there was no conscious assertion of this relation among the Spartans, there may have been some latent recognition helping to justify their aim. Moreover, while there is no dynamometer of

[20]*Ibid.*, "Lyc. et Num.," 4.
[21]Plut., "Agis," 20; "Kleom.," 37, 38.

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intelligence, physique admits of easy estimation. There is therefore a certain justification for the simple dogma of the Spartan lawgiver: "If the parents are strong, the children will be strong."

The Spartans realized that to secure the fitness of the child it must be guarded even before birth by bestowing due care on the food and habits of the future mother. Antenatal influences explain many of the apparent anomalies of heredity, but, while recognizing the value of the Spartan aim, a nobler conception of humanity rejects their method. Sedentary occupations can no longer be assigned to slaves.[22] Society still rests on a basis of lower labour. He "that holdeth the plough" must still "maintain the state of the world," but he is no longer a mere means, a living instrument, excluded from every political privilege and every social reform. The aristocratic eugenic practices of Sparta are amplified into a schema which embraces every class of the community. But this extension involves fresh complexities. By state interference in various ways, such as endeavours to modify "the influence of the factory system on the women who would be the mothers of the next generation," we attempt to palliate where the Spartans were content to neglect.

The Spartans recognized that environment as well as heredity is a factor in the development of man. There is a scheme of physical education for men and women, and the one narrow aim was so exclusively pursued, that it was said of them that they could not even read.[23] There is to be compulsory education, and there is an institution which is to be frequented by all children, on whose development there is no effective control at home.[24] These methodically organized institutions, harmonizing well enough with the monistic view of the Spartan state, could never be adjusted to modern conceptions of individual right.

Apart from the question of quality, there is also the question of quantity. Modern eugenists are faced with the problem of the diminishing numbers of the professional and creative classes and of the rapid multiplication of the less competent. The Spartans were concerned with the same problem in a different aspect: the

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[22]Xen., "Reip. Lac.," 3.

[23]Isoc., "Panath. Or.," xv. 277.

[24]Dr. Querton, "On Practical Organization of Eugenic Action." read before Eugenics Congress.

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rapid reproduction of the under class and slaves.

The Spartans entered Greece as a small conquering nation of Dorians, subjugating an extensive and powerful autochthonous population – they lived as an armed camp in the centre of a hostile population which they dominated. "We are few in the midst of many enemies" was the warning spoken by Brasidas,[25] and this position of constant danger affected the problem in two ways. There must be no falling birth-rate among the Spartans, no unchecked fertility among their subjects. Three measures were employed to maintain the number of the Spartans: prevention of emigration,[26] penalties for celibacy,[27] and rewards for fertility.[28] The man with three children was to be excused the night watch, the man with four was to be immune from taxation. A third measure known to the ancient world, the enfranchisement of aliens, though adopted at times under the ancient kings,[29] was rendered impossible by the later exclusion of every foreigner from the land. Avoidance of moral or physical corruption was set before preservation of numbers.[30] The alien is always a disturbing element in any eugenic scheme.

The natural tendency of civilization, a declining birth-rate, would have brought destruction upon Sparta. Nevertheless, this attempt to maintain the numbers of the citizens seems to have met with little success. Xenophon speaks of Sparta as having the smallest population in Greece.[31] Aristotle tells us that once the numbers of the Spartans amounted to 10,000: in his time they were not even 1,000, though the country was able to support 1,500 horse and 30,000 foot. The city unable to support one shock was ruined. Aristotle finds the cause of failure in the unequal division of property.[32] But nowhere have attempts to interfere with the downward course of the birth-rate met with success: they were doomed to failure in Sparta as they failed in Imperial Rome. There is a moral in the tale of Plutarch, that Antiorus, the only son of

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[25]Thuc., iv. 126.
[26]Xen., "Reip. Lac.," xiv.
[27]Plut., "Lyc.," 15; Athenæus, xiii. 443*c*.
[28]Ar., "Pol.," 1270*b*.
[29]*Ibid.*, 1270*a*.
[30]Plut., "Lyc.," 27.
[31]"Reip. Lac.," 1.
[32]"Pol.," 1270*a*.

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Lycurgus, died childless, dooming the race to extinction.[33]

In limiting the numbers of the subject population, the drastic methods of the ruling Spartans admitted of no failure. Infanticide was brutal, but it was set on a rational basis; this indiscriminate and covert massacre, on the vague pretext of fear or suspicion, was possible only to a people not fully emerged from barbarism. On one occasion more than 2,000 were made away with, "on account of their youth and great numbers." Even Plutarch, with all his Laconism, censured the massacre as an "abominable work," and refused it a place among the measures of Lycurgus[34]

These inchoate eugenics had their measure of success. Surrounded by discontented subjects and hostile serfs, with enemies at their very doors, and no point in the land a day's march away, it was natural that they had no share in the progress of the world around them. But in the seventh century Lyric poetry had found a home on the banks of the Eurotus. Terpander the Lesbian, Alcman the Lydian, Cinaethon the Spartan, show that there was a time when Lacedæmon had cultivated the Muses. The nobles lived luxuriously: the individual was free.

The Lycurgean discipline was therefore no arbitrary product of circumstances: it was a deliberate and calculated policy. As such, it is easy to criticize its limitations, to assert that it mistook the means for the end, that it fitted the citizen only for war, and unfitted him for peace.[35] It is wilful neglect of facts to declare that the only success achieved was the success of the disciplined against the undisciplined: that the only veneration the Spartans received was the veneration of conquerors.[36]

Their whole aim was narrow, calculated, and egotistic; their eugenic system was merely ancillary to the one occupation of war: neglecting all the complexity of man's psychical nature, it aimed at the improvement of a single aspect of humanity, and that not the highest: sacrificing the Sudra caste in the interests of the Brahmins, it aimed only at the production of a breed of supermen. Nevertheless, it is clear that within its narrow confines this rude system succeeded. Sparta has been proclaimed the only state in which the

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[33]"Lyc., xxxi. 25.
[34]"Lyc.," xxviii. 20.
[35]Ar., "Pol.," 1325*a*, 1333*b*.
[36]*Ibid.*, 1338*b*, 1324*b*.

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physical improvement of the race was undoubted, while the chastity and refinement of both sexes were unimpaired.[37] "It is easy to see," declared Xenophon, "that these measures with regard to child-bearing, opposed as they were to the customs of the rest of Greece, produced a race excelling in size and strength. Not easily would one find people healthier or more physically useful than the Spartans."[38]

The Lampito of Aristophanes, introduced as the representative of her race, shows how the Spartan women impressed the rest of Greece. Beauty, physique, self-control – these were the accepted characteristics of the type.[39] Sparta was the proverbial land of "fair women."[40]

The direct influence of Spartan eugenics beyond Sparta was infinitesimal. It was an honour to have a Spartan nurse and good form to affect the rude abruptness of the Spartan manner, but no attempt was ever made to adopt their training or institutions.

But Sparta, too, fell into decadence, as a result of constant losses in war. Xenophon lamented that in his time the Spartans obeyed neither God nor the Laws of Lycurgus.[41] Already, when Plato wrote the Laws, there are signs that Sparta was falling into disrepute, and the politics of Aristotle shows an imminent degeneracy: Ares bears the yoke of Aphrodite, liberty has become license. Agis III. attempted in vain to restore the old Lycurgean discipline, which had become a mere shadow and a name. Kleomenes attained some measure of success, but foreign arms intervened. Nevertheless, the empty husk of the ancient system lasted with strange persistence through centuries of neglect.

The fifth century at Athens was an age of criticism and self-consciousness: the era of reflection had followed the era of intuition, and skepticism brought iconoclasm which shattered the ancient symbols. There were abolitionists, collectivists, social reformers in every phase, but no scheme of eugenics till Plato.

There were the eugenic paper polities of Plato and Diogenes, but their legacy to the world was only "words and writings."[42] The

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[37]Mahaffy, "Greek Literature," vol ii, part 1, p. 201.
[38]"Reip. Lac.," i. 10; v. 9.
[39] "Lysistrat.," 78.
[40]Athenæus, xiii
[41]Xen., "Reip. Lac.," xiv. 7.
[42]Plut., "Lyc.," 31.

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Athenians of the fifth century had nothing but contempt for the institutions of their rivals, voiced in the patriotic travesties of Euripides.[43] Sparta was the national foe.

The intensity of anti-Spartan sentiment may have put such theories beyond the pale of the patriot. Social reformers could find their arguments for communism or promiscuity among Hyperboreans, Libyans, and Agathyrsi; but eugenics was a creed peculiar to the hereditary foe. Nevertheless, certain aspects of the question had been for centuries the commonplace of Greek thought. Even in the proverbial stage of Greek philosophy the gnomic poets among their isolated apothegms have caught some facets of the truth.

In Theognis there is a glimpse of the analogy between the breeding of animals and human kind and almost an anticipatory scheme of Eugenics:[44] "We seek well-bred rams and sheep and horses and one wishes to breed from these. Yet a good man is willing to marry an evil wife, if she bring him wealth: nor does a woman refuse to marry an evil husband who is rich. For men reverence money, and the good marry the evil, and the evil the good. Wealth has confounded the race."

"His starting-point is the true one," remarks the ancient commentator, "for he begins with good birth. He thought that neither man nor any other living creature could be good unless those who were to give him birth were good. So he used the analogy of other animals which are not reared carelessly, but tended with individual attention that they may be noblest. These words of the poet show that men do not know how to bear children, and so the race degenerates, the worse ever mingling with the better. Most people imagine that the poet is merely indicting the custom of marrying the low-born and vicious for the sake of money. To me it seems that this is an indictment of man's ignorance of his own life."[45] Lycurgus, according to Plutarch,[46] used this analogy to demonstrate the folly of other cities where the husbands, keeping their wives in seclusion, beget children from them even if mad, diseased, or past their prime. This was the

[43]Thuc., ii 39; Xen., "Mem.," iii. 5; Eurip., "Adrom.," 597 etc.
[44]Theog., v. 183.
[45]Stobæus, lxxxviii. 14
[46]Plut., "Lyc.," xv. 25.

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starting-point of the Spartan eugenics, as it has been the starting-point of the modern: at Athens it was never more than the sententious maxim of an early poet.

The evils of disparity of age, the thought that "one must consider the ages of those who are brought together,"[47] had formed themes for Hesiod,[48] Sappho,[49] and Theognis.[50] Pythagoras, it is said, had discussed the bad effects of early marriage:[51] Solon had legislated upon it;[52] and had dealt no less with that other recognized evil of antiquity and modern times, the mercenary marriage.[53]

A problem that obsessed the Greeks was the relative influence of nature and nurture, of gametic and non-gametic causes. It is a question almost invariably of morals, though the dominant æstheticism of Greek thought may have reduced the problem to a single issue: "Thou art unpleasing to look upon and thy character is like to thy form."[54]

"Most children are worse than their parents, few are better."[55] "The evil are not wholly evil from birth, but associating with the evil they have learnt unseemly deeds."[56] "Sometimes a noble offspring does not spring from well-born parents, nor an evil child from useless parents."[57] But the general view of heredity was as fatalistic as Ibsenism. No education can make the bad man good: no Æsculapius can cure the moral taint.[58] Just as roses and hyacinths do not spring from squills, so from a slave-woman no free child can be born.[59] Antigone of Sophocles is fierce because her father was fierce,[60] just as the brand of Ibsen was obstinate because his mother was obstinate.

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[47]*Cf.* Stobæus, 71.
[48]*Ibid.*, 695 *et seq.*
[49]*Ibid.*, 20.
[50]*Ibid.*, 457.
[51]Muller, "Fr. Hist. Gk., ii. 278.
[52]Plut., "Sol.," xx. 25.
[53]*Ibid.*, 15.
[54]Stobæus, xc. 9.
[55]"Odyss.," ii. 227.
[56]Theog., 305.
[57]Soph., "Tyro, Fr." 583.
[58]Theog., 432.
[59]*Ibid.*, 537.
[60]*Ibid.*, 471.

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Modern knowledge has justified the Greeks in attributing this dominance to heredity. Men do not gather grapes from thorn bushes, nor figs from thistles: the total contribution of environment is merely opportunity; it can only aid or retard the development of genetic character. The Greeks, except in the dramatic conception of an ancestral curse, or in the inherited pollution of ancient sacrilege, seldom traced causes back beyond the immediate progenitors. Galton held that the individual was the arithmetic mean of three different quantities, his father and mother, and the whole species of maternal and paternal ancestors, going back in a double series to the very beginnings of all life.[61] Greek thought never concerned itself with this third and unknown datum.

Side by side with this interest in questions of nature and nurture is the dawn of that individualistic spirit, which culminated at last in egotistic contempt of offspring and marriage. Heraclitus is the forerunner of Stoicism, Democritus of Epicureanism, and the negative teaching of the sophists is the precursor of that atomistic conception of society which reduced it to a mere complex of self-centred units.

If there had been any attempt to systematize these fragmentary conceptions, we should find it mirrored in the pages of Euripides. All the inconsistencies of current theory are voiced by opposing characters, every speculation that was born "in that great seething chaos of hope and despair," thesis and antithesis but no synthesis before Plato. It is the diagnosis and not the remedy which interests Euripides.

There is the question of the marriage age. It is a baneful thing to give one's children in wedlock to the aged.[62] The aged husband is a bane to the youthful wife.[63] No less is it an evil to wed youth to youth, for the vigour of the husband endures for longer, but a woman more quickly fades from her prime.[64]

There is the denunciation, too, of mercenary marriage. Those who marry for position or wealth know not how to marry.[65] Nature endures, wealth is fleeting.[66] Is it not therefore the duty

[61] "Natural Inheritance."
[62] "Fr." 1 (Phoenix).
[63] "Fr." 2 (Dan.).
[64] "Fr." 8 (Æol).
[65] "Fr." 16 (Melanippe); "Elec.," 1096.
[66] "Elec." 941.

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of the man, who takes good counsel, to marry the noble, and to give in marriage among the noble, and to have no desire for an evil wedlock, even if one should thereby win a wealthy dower?[67] There is much discussion of the relative influence of heredity and environment.[68] Is it not wonderful that poor soil, blest with a favourable season from the gods, bears corn in abundance, whilst good soil, deprived of what it should have received, yields but a poor crop, yet with human kind the worthless is always base, the noble never anything but noble? Is it the parents who make the difference, or the modes of training?[69] And the answer of the ancients was that "Nature is greatest."[70] There is the old adage that no good child will ever come from an evil parent.[71] The opinion that children resemble their parents is oftentimes proved true.[72] Noble children are born from noble sires, the base are like in nature to their father.[73] If one were to yoke good with bad, no good offspring would be born; but if both parents are good, they will bear noble children.[74] Nevertheless, mortal natures are complex things; a child of no account may be born of a noble sire, and good children from evil parents,[75] but no education can transform the bad child of evil stock.[76] The fairest gift that one can give children is to be born of noble parents.[77] "I bid all mortals beget well-born children from noble sires."[78] And the well-born man is the man who is noble in character, not the unjust man, though he be born of a better father than Zeus.[79]

Nevertheless, it remains a duty to educate one's children well.[80] Specialized athleticism was regarded as baneful as over-refinement. You cannot fight an enemy with quoits, nor drive them

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[67]"Androm.," 1279 *et seq.*
[68]"Elec." 941.
[69]"Hec.," 592 *et seq.*
[70]"Fr." 12 (Phoenix).
[71]"Fr." 15 (Dyctys).
[72]"Fr." 10 (Antig).
[73]"Fr." 7 (Alcmæon).
[74]"Fr." 9 (Meleager).
[75]"Elec.," 368.
[76]"Fr. Incert.," 38.
[77]"Herac.," 298.
[78]"Fr." 17 (Antiope).
[79]"Fr. 11 (Dict.).
[80]"Supp.," 917.

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out with the fist. Though war is an evil, military training is an advantage to youth.[81]

Euripides reflects no less the growing cynicism of the age, abusing women, praising celibacy, denouncing the cares and anxieties of bringing up children.[82] There is something, too, of the philosophic egotism of Marcus Aurelius: if you marry, your children may turn out evil; if they are good there is the fear of losing them.[83] But in the "Ion" he speaks with the voice of the old Athenian morality: "I hate the childless, and blame the man to whom such a life seems good."[84]

There is one passage which served as a text for Plutarch's treatise on education, and might serve no less today as a text for modern eugenics:

> ὅταν δὲ κρηπὶς μὴ καταβληθῇ γένους
> ὀρθῶς, ἀνάγκη δυστυχεῖν τοὺς ἐκγόνους.[85]

Aristophanes also reflects all the foibles and obsessions of a skeptical age. The existence of eugenics at Sparta, robbing the theory of something of the revolutionary aspect which it wears today, would perhaps have rendered it less a feature for debate than community of wives or women's rights.

The Thought of Socrates

Nevertheless, if eugenics had ever taken a prominent place in Athenian thought, it would have furnished a richer mine of parody than the fantastic obscenity of the Ecclesiazusæ. It is commonly held that Socrates suggested all the thought and philosophy of the succeeding centuries. We should expect, therefore, to find some cartography, as it were, of eugenics paving the way for the fuller imaginings of his pupil Plato. If we regard Xenophon as the only trustworthy source for the oral teachings of Socrates, we may seek in the "Memorabilia" for these earlier adumbrations.[86]

We find the old question of nature and nurture, and with it an

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[81]"Elec.," 388; "Med.," 295.
[82]"Med.," 1030; "Alc.," 238, 855 *et seq.*
[83]Marc. Aurel. ix 40; "Fr. Œnom.," 2; "Fr. Incert.," 963.
[84]Eurip., 488; "Ion."
[85]Plut., "De Edu.," 2; "H. F.," 1264.
[86]*Vide* Zeller, "Socrates and his School," p. 100.

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attempt to solve the problems of heredity. How is it, asks Hippias, "that parents of good stock do not always produce children as good?" To put the dilemma in a modern form, Why is it that personal value is not necessarily the same as reproductive value? And the answer which Socrates suggests is an answer which has been given to the same question today. Good stock is not everything; both parents must be equally in their prime."[87] The apparent anomalies which children present in not reproducing the qualities of their parents only serve to reveal the presence of particular conditions, and among those conditions must be included the changes which organism undergoes by reason of advancing age.[88]

There are other conditions also. Eugenics begins earlier than birth; the unborn child must be protected by bestowing due care on the future mother. A man, says Socrates, has a twofold duty: towards his wife, to cherish her who is to raise up children along with him, and towards children yet unborn, to provide them with things which he thinks will contribute to their well-being.[89] The fatal handicap may have already begun in the starving or overworking of the mother.

But congenital ability must be emphasized by education: Socrates is deeply impressed with the evils of its neglect both on the physical and spiritual Side. The Athenians, not content with neglecting a good habit, laugh to scorn those who are careful in the matter. When will the Athenians pay strict attention to the body?[90] While Euripides denounces the baneful effect of the great athletic festivals, Socrates laments the indifference which could produce an Epigones.[91]

It is no æsthetic view of morals which makes Socrates insist on the need of physical training: he is concerned rather with the effect of ill-health upon the mind: the reasoning powers suffer atrophy: ill health may expel all knowledge from a man.[92]

There must be moral education no less than physical training. "Corruptio optimi pessima" is the warning of Socrates as well as of

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[87]"Mem.," ii. 4.
[88]Marro, "Influence of Parental Age." Paper read before Eugenic Conference.
[89]"Mem.," book 2, chap. ii.
[90]iii. 5.
[91]iii. 12.
[92]iii. 12.

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Plato.[93] The youth with the best natural endowments will, if trained, prove superlatively good. Leave him untrained, and he will become, not merely evil, but degenerate beyond hope of reclaim. The very magnificence of his character makes it impossible to restrain him.

In the Socratic treatment of eugenic questions there are traces of that individualistic spirit which, neglecting social aspects and regarding only personal consequences, led on in logical succession to abnegation of marriage and offspring. It is not mere momentary desire, says Socrates, which influences human beings in the production of children; nothing is plainer than the pains we take to seek out wives who shall bear us the finest children.[94] And the penalty for error is the penalty, not of human, but of Divine law. What worse calamity can befall a man than to produce misbegotten children![95] And so with training: because the city has instituted no public military training there is no need to neglect it in private.[96] No demonstration of a self-incurred penalty is likely to appeal to the degenerate or feeble-minded

Critias, the pupil of Socrates, seems to have advocated something like a Spartan system of eugenics. "I begin with man's birth, showing how he may become best and strongest in body, if the father trains and undergoes hardship, and the future mother is strong and also trains."[97] But a complete development along Spartan lines begins with Plato, and Socrates led not only to Plato, but to Cynic and Cyrenaic individualism.

Nevertheless, the incivism of the cynic, bringing with it the belief in a self-centered and isolated self, never involved, like the later asceticism, the entire uprooting of all sexual desire. The wise man will marry for the sake of children, associating with the most comely.[98] Antisthenes employed analogy from animal life, but it served only to point the cry of abandonment of cities and civilization, and return to the simple and primitive. The Cyrenaic no less is *κόσμου πολίτης*, and equally an egotist; but complete negation of social duties and actualization of despair was only possible when

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[93]iv. 2; *cf* "Rep.," 497*b*.
[94]ii. 2.
[95]iv. 4.
[96]iii. 12.
[97]"Krit. Muller. Fr. Hist. Gk.," ii. 68.
[98]Diog., ii.

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Greece had lost forever the ideal of the city state.

The Eugenics of Plato

Sparta conceived the first system of practical eugenics; the first formulation in theory belongs to Plato. Archytas of Tarentum, Phaleas of Chalcedon, and Hippodamus, the Haussman of the Piraeus, may have anticipated the Platonic communism: the Platonic eugenics is based on no utopia, but on a living and successful community. The scheme of the Republic, though it owes a little to contemporary thought, something also to contemporary science, is most of all a speculative development of the Spartan system. In this respect one cannot speak of the Platonic Republic as the perfection of the laws of Lycurgus;[99] nor can it be truly said that if Lycurgus had only put his scheme in writing, it would have appeared far more chimerical than the Platonic.[100]

But the Platonic dialogues, and on a higher scale the concise lecture notes of Aristotle, are not the mere exfoliation of a finished product of thought, but a gradual development. One idea devours another; there is thesis and antithesis, and the final synthesis, if achieved at all, is found at the end and not at the beginning. When Plato came to formulate a positive scheme of eugenics, his Spartan model seemed to show him that infanticide in some form was inevitable, when there was no knowledge to control the vagaries of nature. It was the ancient solution of the problem of heredity, and is still the solution of the breeder who "breeds a great many and kills a great many." So the issue of inferior parents and defective children born of good stock are to be "hidden away." Concealment is the Platonic euphemism for infanticide.

There are two types whom Plato would condemn to natural elimination – the victims of constitutional ill-health, and the victims of self-indulgence.[101] Refused medical aid, they are allowed to linger on, but there is no hint of segregation or custodial care to exclude them from parenthood. Under the later eugenic scheme it is clear that the offspring of any such unions would have been ruthlessly exterminated: there was no place in the Platonic Republic for the "unkempt" man, glorying in a pedigree of

[99]Montesq., "Esprit des Lois," vii. 16.
[100]Rousseau, "Emile," 1.
[101]"Rep.," 408.

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congenital ailment.[102] Today the limitations of our knowledge render restrictive measures possible only in the case of the feeble-minded.

But apart from the physical degenerate, there is the moral degenerate, no mere encumbrance to society, but an active force for evil. No law of nature operates for his elimination; therefore, like the lower desires of the soul which cannot be tamed to service under the higher self, his growth must be stopped. Society has no course but to put him out of the way.[103] The modern treatment of the morally incurable is humaner than the Platonic, yet lacking in humanity. We pity degeneracy when it takes the form of disease, but when it takes the form of immorality or crime we blame and we punish. The habitual criminal is no less a victim of heredity than the prisoner in Erewhon, "convicted of the great crime of labouring under pulmonary consumption."[104]

Plato bases his constructive scheme on that analogy of the breeder which has formed the premises, latent or confessed, for all constructive eugenics from the days of Lycurgus. "What very first-rate men our rulers ought to be," says Socrates, "if the analogy of animal holds good with regard to the human race!" Glaucon, accepting the analogy literally and without limitation, justifies the harshest strictures that have been levelled against any such conception of eugenics.[105] In the Platonic Republic, though not in Sparta, there is a race of supermen, the breeders of the human kingdom, arbitrarily interfering with natural instinct in order to produce a noble stock. Plato, recognizing that even in Greece there were limits set to the sphere of the legislator, and unable to appeal to the cogency of assured knowledge to support his philosophic imperatives, resorts instead to childish subterfuge, "an ingenious system of lots."

But compulsion, or guidance, however veiled, is foredoomed to failure in the case of an institution which can only rest on inclination or an innate sense of duty. Moreover, "custom is lord of all," and custom can only be modified gradually and in the course of centuries: it is only the thinnest surface layer with which

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[102]Theophrastus, 19.

[103]"Rep.," 410*a*.

[104]Samuel Butler, "Erewhon," p. 72; Cf. Bateson. "Biological Fact and Structure of Society," p. 19.

[105]"Rep.," 459.

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the legislator can tamper. No social reform or political progress can be effected by the arbitrary creation of institutions to which there are no answering ideas: external coercion with no correspondent reaction can achieve no permanent good. The basis of law is subjective. Even modern eugenists recognized that, if there were to be eugenics by legislation, the eugenic ideal must first be absorbed into the conscience of the nation.

The Spartan system of "compliances" developed into a system whereby the best of both sexes were to be brought together as often as possible, and the worst as infrequently as possible. Greater liberty is to be allowed to the brave warrior, but a liberty within restricted limits, and the concession is not for the sake of the individual, but for the good of the state. Plato is the slave of his analogy.

As at Sparta, there is regulation of the marriage age, a commonplace of contemporary thought, and therefore an inevitable feature of any eugenic system. The parents must be in their prime of life: this period is defined as twenty years in a woman, thirty in a man. A woman may bear children to the state till she is forty; a man beginning at twenty-five, when he has passed "the first sharp burst of life," may continue to beget children until he is fifty-five. For both in man and woman these years are the prime of physical as well as of intellectual vigour. In Sparta we hear of no definite regulation concerning those who have passed their prime, beyond exclusion from child-bearing. Plato's treatment of the problem is "the only point in this part of the Republic which is in any sense immoral, and a point upon which modern ethics may well censure the highest Greek morals."[106]

As to that second problem, the selection of qualities to select for, Plato, like Sparta, chose physique, but chose it because he believed that soul and body are racial attributes that are linked in inheritance. There is no fairer spectacle than that of a man who combines beauty of soul and beauty of form.[107] Physical and intellectual vigour ripen simultaneously. Modern eugenists no less hold it a legitimate working hypothesis that the vehicle of mental inheritance is at bottom material.[108] There is a further require-

[106]Mahaffy, "History of Greek Literature," vol. ii., part 1, 200.
[107]"Rep.," 402.
[108]Eugenics Review, July 1912; Cyril Burt, "Inheritance of Mental Characters."

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ment that parents should as far as possible be of similar nature.

There is no mention in the Republic of that care for the future mother which was a feature of the Spartan system. But there is a twofold scheme of education adapted for the development of other qualities than the merely physical, the first diverging little from the customary education of the day, and then that second formulation which was to culminate in the knowledge of the good itself. Once he had shaken himself free from the military ideals of Sparta, Plato, concerned no longer to write a tract for the times, ends by building an ideal city where only gods or sons of gods could live.

In this scheme of education it is recognized that environment no less than heredity plays a part in the development of the individual. The banks of the stream must be cleansed as well as its source. Good environment is the keystone of the Platonic system; its essence is "nurture." The young citizen is like an animal at pasture; from the things all about him he assimilates good and evil, and what he gathers from his environment becomes embodied in his character. A gifted soul in vitiated surroundings is like a rare exotic sown in unfavourable soil; gradually losing its true nature: it sinks at last to the level of its surroundings. But after all "Nature is greatest." There are lower desires which no good influence can ever spiritualize. Education can only turn to the light the intrinsic capacities of the soul.

The relative influence of these two factors has been expressed in much the same terms today. Men have a considerable capacity for being moulded by environment, no small susceptibility to the influences of education and early training. But these influences operate in a circumscribed sphere. There is in the brain at birth a proclivity towards certain directions rather than others: to this original inherited capacity environment can add nothing; it can only develop or frustrate it. The modern socialist who contends that all men should and can be made equal would find no friend in Plato any more than in modern eugenists.

The Platonic conception of marriage implies an irrational universe. Personal inclination is to be sacrificed on the altar of political expediency. Nevertheless, Plato recognized the power of "myriad voices" of opinion. "In the case of marriages, births, and patrimonies he swerves from the rules laid down for the former commonwealth by making marriages an affair of individuals, and

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the business of the suitors themselves private."[109] He realizes that legal compulsion in such matters would arouse anger and ridicule. Therefore, like modem eugenists, he would trust to the power of public opinion.

The state is to be monogamous, and, as in Sparta and the Republic, there is regulation of the marriage age. A woman is to marry between the ages of sixteen and twenty, a man not earlier than twenty-five[110] or thirty,[111] and not later than thirty-five. The period of child-bearing is to last for ten years; at the end of that period, if there are no children and the parents are free from censure, honourable divorce is to be conceded.

As at Sparta, there is to be care for the future child, set on a wider basis of science. There are times when incontinence, ill-health, moral delinquency of any kind leave their impress upon the mind or body of the offspring. Parents must bear in mind that they are handing down the torch of life to future generations.[112]

Eugenics is being studied from the point of view of medical science. Already in the Republic Plato had owed something to the teaching of Hippocrates,[113] and in this discussion of prenatal influences we may trace a further debt. "To form a child from birth to the best constitution, first of all care must be taken of the seed itself, then of food, drink, exercise, quiet, sleep, desires, and other things, all of which Plato has carefully studied."[114]

The educational scheme of the Laws is a very different thing from that of the Republic. Pitched at a level which makes it possible for all, it leads to no final knowledge of the good. There are public infant schools, but education is to cease after the age of six. Besides gymnastic and music, there is some training in the sciences, but the ideal is Pythagorean rather than Platonic.

No less than in the Republic, in the Laws Plato recognizes that education by itself cannot achieve everything. Men well educated become good men: without gymnastic and other education neither soul nor body will ever be of much account.[115] But a fortunate

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[109]"Apul. Dogmata Platonis."
[110]"Laws," 772*d*.
[111]*Ibid.*, 721*a*, 785*b*.
[112]*Ibid.*, 776*b*.
[113]Galen., p. 875.
[114]Galen., "Hippoc. et Plat.," p. 465.
[115]"Laws," 641*c*, 766*a*.

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nature is as necessary as a good education, and those of the Athenians who become good men become good without constraint by their own natures. Only a few can achieve perfect happiness, and these are they who, divine and temperate, and gifted with all other virtues by nature, have also received everything which good education could impart.[116]

In addition to education and heredity, Plato, influenced, perhaps, by the treatise of Hippocrates, recognizes the influence of material environment. There is a difference in places, and some beget better men and others worse. Some places are subject to strange and fatal influences by reason of diverse winds and violent heats or the character of the waters. Again, there is the character of the food supplied by the earth, which not only affects the bodies of men for good or evil, but produces the same result on their souls. But geographic environment cannot produce a given type of mind any more than education: it can only foster or thwart heredity. It merely determines what shall actually be by selective destruction of the incompatible. As to the negative aspect of this scheme, Plato would segregate the madman and expel the pauper. The madman is not to be seen in the city, but the responsibility rests upon the relatives, not upon the state. If they fail in their duty, the law will punish them. The treatment of the insane was a difficult problem in an age when there were no asylums.

There is another problem, also, which has assumed far larger proportions today owing to the growth of humanitarian sentiment – and the enormous numbers of the modern state. Plato has a simple and ruthless way with the pauper. In a properly constituted state the righteous man will not be allowed to starve: there is no excuse for the beggar. "If such a one be found, he shall be driven out of the market-place, out of the city, out of the land, that the state may be purged of such a creature."[117] When a city is small, there is no difficulty in maintaining the poor; such a prohibition might have been enforced without difficulty in an ancient state. Some may approve of the simple thoroughness of the Platonic method, but the complexity of modern conditions has rendered its adoption impossible.

In the eyes of the modern socialist, unemployed and unem-

[116] *Ibid.*, 642*d*, 992*d*.
[117] "Laws," 936*c*.

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ployable alike are the victims of the social system: to the eugenist, the chronic pauper is often the victim of heredity. With increased genetic knowledge the modern state may be purged of the pauper more slowly, but no less surely, than the Platonic state of the Laws.

Plato, moreover, recognized bodily or mental defects as a bar to marriage, though not viewing the question from its eugenic aspect. He is concerned with the parents, and not with the children. The law does not forbid marriage with an orphan who is suffering from some defect; it merely refrains from compulsion. Modern eugenists, concerned with classifying such defects into transmissible and non-transmissible, regard the question from a different viewpoint. In the matter of inspection to decide the fitness of age for marriage there is something of the idea which came to life again in More's "Utopia" and Campanella's "City of the Sun."[118]

Even in this endeavor to sacrifice ideals to possibilities there is still the apriorism of the visionary. There is more humanity, more concession to the infirmities of human nature, but little that comes within the scope of practical action. Neither the legislation of the Republic nor the precepts of the Laws could have ever realized the Platonic dream of eugenics.

Aristotle – The Culmination of Classic Eugenic Theory

From Plato we pass to Aristotle and the culminating period in the history of ancient eugenics. The Aristotelian scheme is almost entirely negative and restrictive. There is infanticide, but infanticide in its last phase, exposure of the imperfect and maimed, and, in the case of superfluous children, destruction of life in the germ. There is no fantastical scheme for the fusion of parental temperament, no rigid selection on the sole basis of physique.

Like Plato, Aristotle believed in the intimate relationship between psychological phenomena and physical conditions.[119] Body stands to soul in the relation of matter to form, potentiality to actuality; soul is the entelechy of the body.[120] Body being prior chronologically to soul, demands attention first, but only for the

[118]"Laws," 925 *e* and *b*.
[119]"De Anim.," 402*b*, 8.
[120]*Ibid.*, ii, 1, 421*a*, 28.

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sake of the soul.[121] Care, therefore, must be taken that the bodies of the children may answer the expectations of the legislator.

There is no need for a man to possess the physique of a wrestler in order to be the father of healthy children; neither must he be a valetudinarian nor physically degenerate. There is a *via media* between the extremes of specialized athleticism and physical incapacity, and it is this mean which is the desirable condition for both men and women. The valetudinarian who would have been left to die in the Republic may one day be eliminated by the humaner methods of Aristotle. There is much evidence to prove that physical weakness is a case of simple Mendelian transmission.

As at Sparta and in the states of the Republic and Laws, there is limitation of the marriage age. Aristotle recommends the difference of twenty years between the ages of husband and wife, or, more accurately, the difference between thirty-seven and eighteen. Comparison with the marriage age defined in the Republic and Laws shows that ancient thought had decreed no definite period. Four reasons incline Aristotle to select these ages. Since the procreative power of women stops at fifty, the harmony of the union will be preserved by insuring that husband and wife shall grow old at the same period of time. The disadvantages which attend too great nearness or distance in age between father and child are also avoided. More important than all, these ages, consulting the physical well-being of husband and wife, afford the best prospect of well-developed children.

It is possible to approve of the postponement of marriage till eighteen, or even later; but the limitation on disparity of ages seems unnecessarily severe. Aristotle, studying the results of early marriage in other cities, deplored what he saw as its baneful effect on physique.

Like Sparta and Plato, Aristotle forbade those past their prime to rear children to the state. Marriage is thus divided into two periods, and this first period is to last for seventeen years, not ten as in the Laws. Moreover, he would fix even the season for contracting marriage, and in conformity with Pythagoras and Greek custom generally, chooses Gamelion. Today it is held that neither the vitality of the offspring, their physique, nor their intellectual capacity, show any clear correlation with the season of

[121] "Pol.," 1334*b*.

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birth. "There is no atavistic heritage of a special season for reproduction which the human race have originally shown analogous to what one finds today in many species of animals."[122]

"The married couple ought also to regard the precepts of physicians and naturalists." Aristotle, belonging to an Asclepiad family, received the partly medical education which was traditional in such families. Some of his encyclopedic writings deal with medical subjects, and he is said to have practised medicine as an amateur. This is a further stage of the tendency which had begun with Plato's debt to Hippocrates.

Care for the child is to begin before the cradle. And Aristotle insists, like the Spartan legislator, on the avoidance of sedentary occupation and the need for a proper dietary. But he is concerned not only with effect on physique, but also, like Plato, with effect on the mind.

The first seven years of a child's life are to be spent at home, not in the créches of the Republic, nor in the public infant schools of Plato's Laws. This is to be a time of games, "mimicries of future earnest," under the charge of the inspectors of children, for Aristotle held with Plato that the majority of our likes and dislikes are formed in these early ages. Education is to run in cycles of seven years; the child is to be controlled at every period of its evolution. From the age of seven to puberty there are state-controlled gymnastics, but these gymnastics, unlike the Spartan, are merely a means to a further end – the training of reason from puberty to the age of twenty-one. After this, education ceases, and the young man brings body and mind, fully developed, to the service of the state. Aristotle's scheme is merely adumbrated: there are scattered suggestions rather than coordination, and the last stage of science, which is to cultivate the reason, is never mentioned at all.

Aristotle, like the ancients generally, recognizes the importance of both environment and heredity. There are three stages in the formation of character, nature, custom, reason: innate potentiality, environment, self-direction by the light of a principle. We are born good, we have goodness thrust upon us, we achieve goodness. Heredity to Aristotle explains the slave just as certainly as it

[122]Gini, "Demographic Contributions to the Problems of Eugenics." Paper read before Eugenics Conference.

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explains those who never will be slaves; yet to admit emancipation for all slaves is to confess that there is no slave by nature without the potentialities of full manhood. It is true that some men from the beginning are fit only for that lower work on which the fabric of society must rest. The maintenance of heterogeneity is an essential condition of progress: there must always be the *minuti homines* at the base of things, though we have long since passed from the permanent grades of Plato, Aristotle, and the Middle Ages. Plato, indeed, at one period seems to have conceded that the man from the copper class might rise to the silver or gold, and it is at this that social reform must aim, not to abolish class, but to provide that each individual shall, as far as possible, reach his proper stratum and remain in it.[123]

Like Plato, Aristotle recognizes that there are victims of heredity who can never be made good by education.[124] But this factor of heredity is amenable to no certain control. Helen may boast of her immortal lineage, but those who think it reasonable that as a man begets a man and a beast a beast, so from a good man a good man should be descended, these fail to see that, though such is the desire of nature, her failures are frequent.[125] Nature's aim is perfection, to make this the best of all possible worlds; but there are failures because matter is not always congruous with form.[126] But "Nature's defects are man's opportunities": matter must therefore be helped as far as possible to the realization of its true form by the human agency of education.

So much importance did Aristotle attach to education that, like Sparta, he would make it entirely an affair of the state. There is to be one educational authority and one sole system of education.

The laws of Aristotle are as catholic as the laws of Alfred: "the legislator must extend his views to everything."[127] Therefore his eugenic scheme will be enforced by law. His aim is to embody public opinion in law, not to educate opinion to such a point that law will become unnecessary.

"Every city is constituted of quantity and quality."[128] Aristotle,

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[123]*Cf.* Bateson, "Biological Fact and Structure of Society," p. 33.
[124]"Pol," 1316*a*.
[125]*Ibid.*, 1255*b*.
[126]"De Cæl.," 271*a*.; "Gen. An.," iv. 4, 770*b*, 16.
[127]"Pol.," 1333*a*.
[128]1296*b*.

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therefore, no less than Plato, would fix an ideal limit to the population as well as regulate its quality. In the Aristotelian scheme, as in the Platonic, there emerges a certain Malthusian element; but it is a legal ordinance and not a natural law: it is to prevent population from interfering with the equalization of lots, not from outrunning the limits of subsistence. He conceived that Plato's plan of unigeniture made it more than ever essential that there should not be too many sons in a household, and yet, in his view, the Platonic means were insufficient. But there is also the conception of the mean, of an enclosing limit flowing naturally from the teleological method. Just as a boat can no more be two furlongs long than a span long, so a state can no more have 100,000 citizens than ten.[129] Its essence lies in the fact that it can easily be comprehended as a whole.

Yet, though Aristotle held the State to be a natural organism, he would not concede that hypertrophy was prevented by natural laws without the need for human cooperation. It is absurd to leave numbers to regulate themselves, according to the number of women who should happen to be childless, because this seems to occur in other cities.[130] Rejecting as a mere palliative the remedy of colonization, which Pheidon of Corinth had suggested, and Plato had kept in the background of the Laws, he insisted that a limit must be set to the procreation of children, even during a seventeen years' term. When infractions occurred – and one would imagine that under such circumstances they would be of frequent occurrence - there is not to be exposure, which is impious on the ground of superfluity, but destruction of life in the germ.

Today limitation of numbers among the upper classes of the community is being brought about naturally by the increase of foresight and self-control. It is the lower classes whose reckless propagation constitutes the problem of modern eugenics. Aristotle, denying these classes the rights of citizenship, and treating them politically as cyphers, sets them outside his scheme of social reform. The number of slaves, resident aliens, and foreigners, is to be left to chance, "and it is perhaps necessary that their numbers should be large."

The Aristotelian eugenics, therefore, are as selfish and paroch-

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[129]"Eth.," 9, 10, 3.
[130]1265*b*.

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ial as the Spartan. As in the animal body, the homogeneous are for the sake of the heterogeneous.[131] Where eugenics is most necessary, eugenics is denied; the man who performs a task which ruins his body or his mind is set beyond the pale as a mere living instrument. This was the simple pre-humanitarian solution of a difficult problem. But Aristotle recognized, as eugenists recognize today, that any scheme of constructive eugenics must be set aside as visionary and impracticable,[132] so slender is our knowledge of the genetic processes of man. Aristotle, finding a scapegoat in a mythological nature, abandoned the problem as insoluble: today we are still seeking some outline of an analysis of human characters.

The chief interest of the Aristotelian eugenics lies in the fact that he set out to construct a scheme which should be practicable for Athens, no academic speculation in the clouds, but a possible plan of social reform. "The legislator must bear two things in mind – what is possible and what is proper. It is not enough to perceive what is best without being able to put it in practice."[133] Hence careful attention is paid to popular opinion and existing custom. The *consensus mundi*, the collective capacity of the many, are factors the importance of which he constantly emphasizes. This "divine right of things as they are," involving a certain conservatism, led him to uphold any custom revealing after analysis a balance of good in its favour. Hence the acceptance of infanticide and slavery, and regulation of the marriage age. The doctrine of the mean also, which helped to decide the proper disposition of parents and to fix the number of the state, was an essential article of received opinion. If Athens had ever instituted a eugenic system, it would have been the system of Aristotle, not of Sparta or Plato. Aristotle, applying the idea of development to knowledge as well as to the objects of knowledge, not only conceived his own theories as a development of those of his predecessors, but imagined himself as standing at the culmination of Greek thought. This eschatology was justified. The politics not only set the final seal upon political science in Greece, it marks also the last word in eugenics.

Looking back upon these past systems, we find that the task

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[131]Arist., "Part. An.," ii, 1.
[132]Bateson, "Biological Fact and Structure of Society," p. 12.
[133]1289*a*.

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was easier for a pre-Christian age which could sacrifice the lower classes in the interests of the higher and solve the problems of heredity by infanticide. Even when the influence of Sparta had died away and eugenics was regarded no longer as a mere ancillary to war, parochialism confined it to a single state, inhumanity to a single class. The features which are so prominent in all these early schemes – precise limitation of the marriage age and detailed schemes of education – are features which, though still recognized, no longer have their place in the foreground of modern thought.

The Greeks were concerned more with the banks of the stream; the modern aim is to control its source. The gradual process of social reform during the first three quarters of the nineteenth century has gradually brought us farther back in the course of successive stages. From measures of sanitation and factory laws we have passed to national schemes of education. A gradual extension of aim has led to efforts to guard the child at birth, even before birth; and, finally, eugenics has set itself to solve the problems of heredity. The "Life-History Albums" of Galton would trace the workings of the ancestral curse, the *Ate* of inherited disease as well as of inherited sin: Mendelism would render possible a factorial analysis of the individual.

Nevertheless, though the Greeks abandoned the question of heredity in despair, and, unable to prevent its victims being born, slew them if possible at birth, they realized many of the problems which, 2,000 years later, are still confronting eugenists, and they realized in part the remedies. It is wrong to say that antiquity never raised the question as to whether a hereditary disease or predisposition to disease should be a bar to marriage. The Spartans, Plato, Aristotle, all realized the problem, Plato returning to atavism for his remedy, Aristotle conceiving the humaner methods of modern eugenists. Sparta and Plato, too, were not blind to the need, today so urgent, of restrictive measures dealing with the insane, and Plato even dreamt of segregation. There is the recognition, also, that eugenics is the sphere of the physician as well as of the philosopher; that quantity is a factor in the problem as well as quality; that selective eugenics must regard the mental as well as the physical. But even that final formulation in the pages of Aristotle, which would have been possible to the age, and more possible today than the narrow scheme of Sparta or the unsubstantial visions of Plato, even these saner eugenics have in them much

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that is impossible, no little that is abhorrent, to thinkers of today. But the idea had been given life and brought to bear. Long after the sowers had passed away it sprang to renewed existence in a different age and in a different form, engendered by new conditions.

After Aristotle stretches a gulf of years in which eugenics lies amid the lumber of forgotten theory. The state education of the fourth century may have owed something to Plato and Aristotle, but there is no state control of marriage. Zeno and Chrysippus, influenced, perhaps, by a perverted Platonism, advocated community of wives. But Zeno taught that the intelligent man should avoid all public affairs except in a state approaching perfection; and Chrysippus, writing a treatise on the education of childhood, is reproached by Poseidonius for neglecting its first and most important stages, especially those before birth. "Poseidonius blames Chrysippus and admires what Plato taught about the formation of children while yet unborn."[134]

No attempt was ever made to realize the ideals of the Republic "except by dreamers and somnambulists at second-hand in an age of mysticism and social degeneration." Plotinus obtained from the Emperor Gallienus and his wife the concession of a ruined city in Campania, which had once been founded by philosophers. He proposed to restore it, name it Platonopolis, and adopt the laws of Plato.[135] This early anticipation of the Oneida Community never seems to have been realized.

In the "Utopia" of Sir Thomas More, the marriage preliminaries, suggesting something of Plato's physical point of view, recall a passage in the Laws. But in Campanella's "City of the Sun" we find a closer approximation to the Platonic eugenics. Marriage, recognized as an affair of the state rather than of the individual, because the interests of future generations are involved, is only to be performed in the light of scientific knowledge. The "great master," who is a physician, aided by the chief matrons, is to supervise marriage, which will be confined to the valorous and high-spirited. There is to be a system of state education, and the women are trained for the most part like men in warlike and other exercises. Campanella has been called the prophet of modern eugenics: he

[134]Galen., "Hipp. et Plat.," v. i., p. 465.
[135]Porphyry, "Plotinus," c. 12.

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is the connecting-link between the crude eugenics of the past and the scientific eugenic possibilities which are now emerging as a result of our increasing knowledge of human eugenics.

Decline in the Hellenic Age

Realizing only vaguely the difficulties with which modern science has encompassed the problem, the ancients might have been expected to have cherished the ideal till actual experiment revealed these incommensurable factors. With their conception of the state as an *etre moral collectif*, with their recognition of law as the sum of the spiritual limits of the people, with the favourable support of the *consensus mundi* which Aristotle never opposed, everything seemed opportune for its realization. But just as a good man is crushed by a bad environment, so a social theory must wither in an unresponsive age. Eugenics is dependent upon the ethical perspective; the philosophy of egotism – *le culte de soi-meme* – finds no appeal in a theory which looks beyond the pleasure of the individual to the interests of the future race.

From Socrates to Aristotle philosophy has striven to stem the current of political dissolution, and in philosophy we see an insurgent pessimism, an evergrowing prominence assigned to the theoretic life. The supremacy of Macedon signalized the final breakdown of Greek civilization. Aristotle, standing on the border-line, found in classic antiquity an influence sufficiently strong to place the community in the foreground as compared with the individual.

After Aristotle, the tendency, which had already been at work among the philosophers of the Academy and the Peripatetics, completely reversed the position. Turning aside from the ideal of man as an organic member of society, philosophy concerned itself instead with the satisfaction of the ideas of the individual.

In place of their old dead principles men required new guides: they sought and found these in two directions – in Orientalism and philosophy. From Orientalism they learnt to profess complete detachment from an ephemeral world of sordid corporeal change, to contemn women and offspring, to throw aside costume, cleanliness, and all the customary decencies of life: Karma will soon be exhausted, Nirvana attained. No theory of racial regeneration can flourish in such an atmosphere of inconsequent egotism.

Epicureanism, with its watchword of "seclusion," teaching its

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disciples to forego marriage and the rearing of children, can have had no place for eugenics. Equally opposed is the tendency of Stoicism, which "draws such a sharp distinction between what is without and what is within that it regards the latter as alone essential, the former as altogether indifferent, which attaches no value to anything except virtuous intention, and places the highest value in being independent of everything."[136]

Such a system is not likely to concern itself with the interests of a state in which the mass of men are fools, and denied every healthy endeavor. It is true that besides this tendency toward individual independence there was a logical development of Stoicism which recognized that man, to obtain his freedom, must live, not for himself, but for society.[137] But it was the earlier end that continued to predominate, bringing Stoicism nearer and nearer to the selfish egotism of Epicurus. It is only in a community of wise ones that a man will marry or beget children.[138] A generation imbued with such philosophies would have as little thought of racial improvement as an age which found its guidance in the teachings of Schopenhauer and Hartmann.

Moreover, cosmopolitanism, consequent on the dissolution of the city state, not only brought individualism in its train, but let loose the inveterate pessimism of the ancients. So long as the city state existed, the Greeks, forgetful of the Golden Age in the past and the inevitable cataclysm in the future, concerned themselves with the future progress of a limited race. But pessimism, linked with individualism, became a living force in a despairing age, which had never developed the evolutionary conceptions of Anaximander. The creed of a warrior caste, even in the hands of Plato and Aristotle, had never lost its aristocratic character, and when this spirit gave way before the cosmopolitanism and individualism of subsequent philosophy, directing human values away from an evolutionary worldview, the eugenic ideal died and remained lost for centuries. Neither the future nor the past mattered to men whose creed was selfish individualism, but only the present.[139] Extreme individualism, and a new religion that represented human

[136]Zeller, "Stoics and Epicureans," p. 310.
[137]Cic., "Fin.," iii. 19, 64; Sen., "Ep.," 95, 52,("membra sumus corporis magni").
[138]Epict., "Diss.," iii. 27, 67.
[139]"M. A. Disc.," 112.

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affairs as being the will of God, were the two influences which effectually thwarted the further growth, and indeed the very survival of, classical eugenic thought.

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Apollo the Wolf-god

Daniel E. Gershenson

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Malthus Revisited

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It is generally accepted that population growth will confirm the predictions of Malthus unless effective measures are devised for population control. With a world population which has doubled in the past thirty years to around 5.5 billion today, which grows every *two and a half years by more than the total population of the* U.S.A., and which is expected to double again within the next thirty years, we can already see Malthusian consequences in many of the Third World countries. Conscientious intellectuals have become alarmed at the prospect of a universal worldwide return to Malthusian conditions, and at the threat which this rapidly expanding human population poses to the health of the ecosphere.

In consequence, concerned demographers and others constantly search for methods with which to counter the ongoing population explosion, made possible by the application of medical and other modern technologies which have neutralized the forces by which Nature has maintained some kind of rough balance between man and his habitat in the past. Many diseases which formerly controlled human populations have been suppressed and infant mortality rates have fallen drastically, while longevity among those who survive infancy has also increased. A redirection of altruism from the former limits of tribe and nation to a new worldwide sense of humanity has encouraged the more advanced nations to seek to help the poorer nations raise the large numbers of children that the latter produce. This contrasts with the former situation in which nations could raise no more children than they themselves could support. This assistance has actually served to further impoverish the poorer nations by increasing their population to unstable Malthusian levels. The resultant burden of population pressure prevents any rise in the standard of living and consequently many have become permanently dependent on foreign aid and donated food to stave off – or in reality to postpone – an eventual Malthusian disaster.

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To a lesser extent the same demographic pressures are building in many of the larger cities of the Western world, namely among the inhabitants of the impoverished inner city "ghettoes," where a significant population increase is aided by internal transfers of wealth from the producers to the non-producers. Los Angeles is just one example of a formerly prosperous city in which the areas of overpopulation and poverty are spreading. Add to this the fact that there is a growing trend for the excess population of the poorer countries to escape the Malthusian crisis by migrating to more prosperous countries not handicapped by excessive population growth, and it becomes logically apparent that a return to Malthusian conditions is a real possibility for the world as a collective whole. All countries are now threatened by future over-population, even if their own native population may actually be breeding at below replacement level, even apart from the global threat of ecological disaster as this vast new mass of humanity creates deforestation and converts fertile land into desert.

Population control may indeed be the only route that may save humanity from total elimination – a possibility that is becoming very real. Centuries ago, Malthusian conditions merely pruned mankind along with all other forms of life. But today, nuclear war becomes increasingly probable as population pressures increase and nuclear weapons proliferate, and this would constitute a threat to the survival not just of mankind but of all higher forms of life.

But to date most of the counter-measures which are under active and open consideration are voluntary appeals to individuals to limit their procreation through family planning or other personal restraints. Few, however, anticipate the long-term feasibility of such restraints. Even the need for procreative restraint is scarcely considered to be an acceptable topic for discussion in most countries of the world. Greatly improved standards of living normally tend to reduce fertility, but the present population growth rate for the world as a whole exceeds the annual increase in productivity, and the chance of raising standards of living in the Third World, or even in the inner cities of the Western world, sufficiently to reduce fertility in any meaningful way has now become a chimerical dream. And there is another critical factor that makes the long-term evasion of the Malthusian condition so difficult: any solution that controls population, without at the same time breaking the correlation between fertility and personality

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characteristics, means that the next generation will be bred from exactly that portion of the population that has failed to practice reproductive moderation for either biological or cultural reasons, or both. We may therefore find ourselves selecting in favor of high fertility and merely passing the problem to future generations in an accentuated form until Malthusian disaster becomes unavoidable.

In short, that segment of the world population that continues to reproduce at high rates despite the concerns expressed by demographers will constitute the primary population of the world in the next generation. Selection will be slanted against those most prepared, by personality and culture, to reduce the number of their offspring, in favor to those who by genetic nature and cultural proclivity are most inclined to produce more offspring. Those who exercise restraint now will be hopelessly outnumbered by those who do not. To put the matter succinctly, "freedom of reproductive choice" will in the end deny freedom of reproductive choice by the most draconian of Malthusian selective practices. Evolution does not guarantee that the wisest will survive, it only guarantees that the more fertile will predominate – providing they have at least the necessary cunning to survive long enough to produce yet another generation.

In spite of frequently expressed concerns about world overpopulation, the implications of the above are still insufficiently discussed, and are typically ignored by such authors as the Ehrlichs (Ehrlich, 1990), whom many have come to regard as authoritative. Indeed, the Ehrlichs took the position that since we can do little to stop the Third World from reproducing so profusely, the more advanced nations should reduce their populations even further than they are presently doing. They did not consider the possibility that the more advanced nations might stop fueling the population in the Third World by further supplies of food and medical supplies, or that the more advanced nations should close their borders to the wave of economic "refugees" from those countries which are virtually doubling their population every quarter of a century. Current Western ethics would prevent that, and consequently are hastening the ultimate Malthusian crisis. Clearly, the topic needs further exposure and research, as this country has an ethical obligation to evaluate the effects of social policies which have such a significant impact for our progeny. This paper

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attempts to obtain a higher priority for discussion and research concerning the evolutionary implications of the various methods which could potentially be applied to counter the population explosion and avoid a return to a Malthusian scenario. In light of the already overwhelming size of the human population and its present rate of increase, the latter is now a real possibility. We need discussion because many of the issues are ethical rather than scientific, and even where scientific are not amenable to laboratory analysis. We need further research to explicate the options in much greater depth than can be covered by a single author or paper.

While it is difficult to find comfortable procedures for assuring that there is no correlation between the proclivity to over-reproduce and genetic or heritable characteristics that cannot, like the sex drive, be rendered demographically unimportant through the use of contraceptives or sterilization, two generic approaches will be described for illustrative purposes. Ignored in these models are adjustments needed for eugenic purposes such as the elimination of serious genetic defects and the enhancement or maintenance of intellectual capability. This exclusion is not to be interpreted as indicating that eugenic measures are of trivial significance. They are of crucial importance but are excluded here simply to limit the present discussion of population control to manageable dimensions. In any implementation plan these would necessarily be either combined or very closely connected, but at this stage the emphasis is upon establishing requirements for population control rather than upon developing implementation plans.

Putting aside moral appeals for reproductive self-control as being unlikely to achieve the desired limitation on worldwide reproduction and as being defective in that high fertility rates would likely continue among those who by nature and culture fail to respond to any moral imperative for reproductive self-control, we will consider the situation in societies which might place strict legal ceilings on permissible fertility. This has already been attempted in some dictatorial societies such as the People's Republic of China which applied penalties to those who contravened legal limits on reproduction. Also, in the Republic of India attempts were made to restrict fertility by economic inducement to those who agreed to be sterilized. Such measures could also conceivably be applied to check excessive reproduction by those

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unable to support themselves and dependent upon government welfare in democratic societies once the pressure of population became sufficiently acute that a sufficiently large segment of opinion conceded that urgent measures to control its increase were necessary in the public interest.

Thus the problem is not just a matter of halting the present demographic explosion, but of achieving this by a means which will not result, as is already happening, in an evolutionary selection in favor of those who by nature or culture are inclined to produce numerous offspring through lack of foresight. The former are essentially healthy individuals responding to natural urges to produce more offspring than the environment can support. Evolution could not have taken place otherwise. But, as we have already noted, modern technology has emancipated man *temporarily* from nature's Malthusian pruning knife, and so far as we can see into the future from our vantage point in this generation, because of our enhanced technology, future generations of mankind need to possess a nature which will enable them to restrict fertility within limits such as this earth can ecologically sustain, hopefully voluntarily.

Demographic control plans which are likely to be sustainable in the long term, and avoid the fury of a delayed Malthusian reaction, are those which would breed individuals who would respond favorably to the need for rationally controlling the number of their offspring. One could say that this is, in a sense, a eugenic goal – to breed selectively for rational offspring, capable of orienting their actions towards long term goals (notably the survival of mankind) rather than reacting in an unplanned and automatic manner to demands for "immediate satisfaction." Perhaps this contradicts our earlier assertion that eugenic considerations will not be considered in this essay. If so, let us concede that this particular eugenic goal must of necessity be taken into consideration in examining any potential solutions for the problem of warding off a Malthusian condition.

The simplest and most straightforward approach to controlling population growth without favoring one race over another, and at the same time (disregarding all other eugenic considerations) avoiding any selection in favor of those who may be either genetically or culturally inclined to continue to reproduce at high rates, is to mandate equal-size families for all individuals, groups

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and races. This may be a self-contradicting goal, but it is more or less the solution adopted in mainland China – although it is doubtful if consideration was ever given in Beijing to the need to avoid any selective process such as we have described. Indeed, reports from China indicate that the more cooperative elements in the population did in fact restrict their offspring to the intended goal (which because of the severity of the over-population problem was set at one child per couple). Thus we hear that the sons and daughters of the political leaders, holding conspicuous positions, did in fact adhere to the government ruling, but that the peasants living in more remote areas, and the lower levels of Chinese society generally, failed to adhere to this low procreative limit despite the rewards and penalties imposed by the central government.

There is also a purely technical problem when the procreative target is set at "replacement" levels rather than an arbitrary integer, such as one child per couple as officially required (but not adhered to) in China. Family sizes selected to provide for exact replacement would range between 2.1 and 2.3 per couple for most societies. In order to obtain non-integer values to be applied to all families, something similar to a military-draft lottery would be required. An example of how this might be accomplished would be to assign each family a random number, and those with numbers below a given threshold would have two children, and those above, three. At this point one begins to appreciate the additional problems involved if one seeks to ensure equal rates of reproduction for all, instead of adopting outright eugenic measures which would severely reduce reproductive rights for those unlikely to be capable of supporting their offspring or who would produce offspring which would likely be incapable of supporting themselves.

A second highly intrusive approach that might be employed by an authoritarian or despotic society – or even, as a remote possibility, in a democratic society direly threatened by overpopulation – is more drastic but more subtle. The thoughtless reproduction of unplanned and often unwanted offspring by unthinking parents such as occurs frequently in the ghettos of Western cities would be prohibited altogether by sterilization after the allocated number of children had been born. For others, merely interested in raising a larger family in a loving home environment, what would be mandated is not the number of children in the home, but rather that the genetic connection be broken by requiring donation of

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germinal material from those who wished to rear fewer children than their assigned number – the children from this donated germinal material being raised by those desiring a larger family. This could be accomplished either by transferring the genetic material such that the receiving-family mother carries the child, or the child could be carried by the donating mother and transferred after birth, as in the case of adoption. The latter has the difficulty that the donating mothers could become emotionally attached to the child, which could result in a personally traumatic experience for the donating family.

It is also virtually assured that even when controls over reproduction are introduced, some number will by accident or intention evade such controls. If such "cheating" were ignored, then it would have survival value, and, in time, it would become so common that all hope of avoiding the Malthusian end would be lost. Therefore sufficient penalties or actions would be required to hold "cheating" in any society to a negligible level. Question, what do you do if the rule is broken? Some obvious things come to mind, but none of them are at all compatible with current Western values. Those listed below may not be exhaustive, but suggest the character of the easy-to-find solutions:

* Abort the fetus.
* Destroy the newborn child.
* Sterilize the newborn child.
* Reduce the allowance for children of close relatives to compensate for the extra child squeezed in.

The theory of the last item is that one trades off children for the extra child against relatives who are assumed to share the genetic qualities of the mother who either "cheated" or had an "accident." Certainly none of the above would be acceptable to any significant part of a Western population. It is even harder to conceive of a society pursuing such policies in perpetuity. On the other hand, for us to allow our society to descend to the Malthusian state is not a very ethically defensible course either.

There is the question of whether such "intrusive" measures could ever be adopted in a democracy, even one imperilled by over-population through either excessive reproduction or excessive immigration. To date, only China has embarked upon a birth

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control program of similar intrusiveness, and even in this case the extreme difficulties in carrying it forward have overwhelmed the program. In the case of the U.S.A. and Moslem countries it would seem to be contrary to religious principles which decline to consider the well-being of posterity or even the very survival of mankind, believing that this is in the hands of God. If a country or a group has no ethical concern for the future, then the problem of over-population is moot. No active response to the threat of the arrival of a Malthusian state is likely to be sought. A significant dilemma is that sound arguments can be made that solving the problem requires unethical means, but failure to seek and implement a solution would also seem to be unethical. No matter whether "individual rights" or "social rights" are given greater weight, there is an obligation to arrive at a studied and purposeful conclusion, as contrasted to default.

In general debate and private discussion, three not very logically defensible themes emerge which are offered as counters to the proposition that we must do something about the population explosion. These are provided as a matter of completeness, not to give them scientific status. One of these is the notion that the Malthusian state is natural and not so bad after all. One can point out the high culture of classical Greece, where population was kept in check by Malthusian means. But modern technology has created conditions where the world population has reached a level which if unchecked promises complete ecological destruction in the not too distant future. Further evidence of the unpleasantness of Malthusian pressures is the number of people who are anxious to enter this country from states very close to the Malthusian condition. A second excuse to evade responsibility is to get lost in grand philosophy: "You need to learn to flow with history, every civilization has ultimately foundered. We can do nothing about it," or "Given that we are faced with a dozen other problems of importance, humanity will never make it anyway. I am not willing to mess up my life for a lost cause." That one is harder to answer. Perhaps the weakest argument, but one heard frequently, is that "evolution by natural selection is over, and our inherited physical characteristics are so nearly fixed, that we practically can only modulate our condition by changes in our environment."

Turning to the question of the feasibility of implementation, there is the problem of how to enforce such stringent controls over

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a function (reproduction) that is generally viewed as one of the most basic of individual rights. In India, the offer of financial rewards for accepting sterilization failed, although perhaps only because the financial reward was not great enough. Certainly, large payments to the incapable and impoverished who currently produce large numbers of offspring (which in turn usually become a burden on society) might induce many to voluntarily accept sterilization. It is also arguable that a sufficiently large payment would make good economic sense, not only in countries like India but also in the United States and other Western countries, where a large number of incompetent children who would otherwise have been a major economic burden on the social welfare system would not be born. But could such a voluntary reward system be extended to the entire world as a counter to the Malthusian threat? In view of the huge numbers we are talking about, the answer would seem to be in the negative.

Evolution favored those who desired and produced large families, and from a eugenic point of view one might argue that it would be desirable for healthy individuals and with a high IQ to actively desire large families while we should breed only few offspring, or not at all, from those with harmful genetic qualities including low IQ. Many of those currently producing large families are perceived to be of relatively low IQ. But there is another aspect of the problem we shall face if we seek to breed a population which will be content to avoid over-reproduction in the future. Most personality traits seem to have a high heritability, and it would seem reasonable that such a trait does influence family size. A recent article in *Science* (1,1990) gives a good technical summary of the results of the Minnesota Twin Studies, a program that covers the heritability of personality characteristics in depth. A summary article on the same subject as the Minnesota Twin Studies, in a more popular style, is given in *U.S. News and World Report*. (2, 1987)

Consequently, it seems quite probable that evolution has already established a heritable trait corresponding to a desire to produce a large number of offspring. Nevertheless, one can argue that nature's previous and present use of sexual desire to assure procreation means that there is no genetic tendency, apart from lust, which can now be thwarted by birth control, for evolution to reinforce. There are several arguments that suggest that the above

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objection may not be true. The most direct evidence is the "baby hunger" that many women experience, which is presumed to be an inherent quality developed by evolutionary needs.

If one is attempting to achieve a population which is not evolutionary-oriented toward population increase, there may be some who might accept limitations on the upper side of family size, but not countenance requiring children where none were wanted. If one did this, then eventually those who wanted less than the allowed number would breed themselves out of existence, which is one of the reasons why humanity, like all living organisms, comprises individuals whose inherent tendency is to over-reproduce. Modern ethics might suggest that it is unfair in the extreme to bring unwanted children into the world. But that "working out" would exact a significant price. The typical or representative family's desire for children would have to increase under that arrangement such that chance variations due to environment and the genetic lottery would almost never call for having less than the then current "standard" number of children. If one could control the mean of the distribution of "desire for children" to minimize the discrepancy between the mean defined by the plan and the actual, then the mismatch between desired and actual family sizes would be minimized. In order to minimize the overlap of the distribution with the choice for no children, the mean of the desire for children would need to rise to a point that the overlap was negligibly small. This would indicate that the average family would have to have fewer children than they thought desirable, and that in perpetuity. With such a high level of desire for family, it is questionable whether fear of the Malthusian state would be sufficient to hold the level of births in check, particularly in a democratic society. This is especially true because the Malthusian condition would be abstract and not a personal here-and-now threat.

Similarly, a church or religion that taught that childbirth limitation was contrary to God's law, and therefore anathema, could scarcely exist on amicable terms with a state that specified an exact family size and exacted successful penalties for non-compliance. If the society were democratic, then there would be a significant threat to the controls necessary to assure the avoidance of a Malthusian conclusion. If the state granted exceptions to religious objectors, then the number of the latter would increase

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to the point that political power would belong to them. Others who wished to evade the iron law might tend to form or join churches to achieve this benefit, and quickly the whole scheme would fall apart. There is little more to say but that there is a fundamental and irreconcilable conflict. The choices would be clear, but what is rational in this context would certainly be disputed.

Questions of race also cannot be overlooked. People are born into groups, and have natural prejudices, which at one time certainly served an evolutionary purpose, and might still, in their own group's favor. The heavy hand of those who sought to control fertility could and probably would be interpreted as a hand laid most heavily on one's own group if the members of that group were more prolific than others. This, despite the postulated even-handedness of the proposed scheme. If one adds eugenic considerations, which would seem the rational thing to do (why produce more children with a 55 IQ if the world is already close to Malthusian levels?), then one can be certain of racial tensions. Some have already agitated in favor of merging all the world's separate racial and ethnic groups into a common homogenized "universal" man, but not only would this destroy thousands of years of evolutionary diversification, but it would probably in no way terminate man's natural tendency to associate in one kind of group or another, and hence would provide no solution at all. Also, this could only be achieved by long-term social engineering, using iron-clad repressive controls, which would only add to the problems facing the world, besides almost surely failing to eliminate human tendencies to form either social or genetic groupings.

In light of all this there is a strong temptation to accept the principles of evolution as they applied to our ancestors, and to accept a reversion to Malthusian competition. This means allowing the less competent to starve, instead of deliberately supporting them while they proliferate at destructively high levels (women in many African countries average six or even seven live births). This is deemed unethical in Western society due to extension of the altruistic inclinations in Western nations to embrace the whole of humanity. To Westerners the days when nation competed with nation and race with race seem properly to be things of the past. But this is not the view of the majority of the world's population. Most still think in terms of evolutionary competitiveness, and regard large families as strengthening their power. The leaders of

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ethnic minorities inside the United States have openly welcomed the rapid growth of their communities as promising their group greater power and influence in the political arena. To many countries which export their surplus population to other countries the only challenge is to find other territories to occupy, other countries to invade. Koreans and Vietnamese are known to think this way, as also increasing numbers of Chinese on Taiwan and even on the mainland. The modern world has not universally accepted the idea of universal altruism. Evolutionary principles, based on competitive reproduction and competitive survival, are still in force among the majority of the peoples of today's world. Thus any birth control program is a "bone in the throat" to such people, who will cry "genocide" when they are actually quite happy to outbreed those whom they consider their rivals, and take over by sheer weight of population their rival's territorial property.

Even where some advanced countries have succeeded in solving their own population problem, as Japan has done (and we cannot yet say whether this has been permanently achieved), or as most European countries have done – some, such as Germany and Holland, even being threatened by a decline in their indigenous population – we are already seeing that they have not escaped the impact of the world population explosion. The poorer "Third World" states have not followed their lead, and jealousy and envy now place those advanced countries in a somewhat precarious position. Their present attempt to support the population of the countries undergoing a demographic explosion threatens with time to overwhelm them, both in respect to their resources and also of their geographical independence.

Aid to the poor countries already grappling with Malthusian restraints merely exacerbates the problem by helping more young people in those countries survive to reproduce. This is the vicious circle that engulfs any country that falls into Malthusian conditions. And the higher standard of living enjoyed by those countries which have not fallen into that condition acts as an economic magnet, bringing in immigrants in increasing numbers until conditions between the more prosperous and the less prosperous have been levelled down to a universal Malthusian existence. To prevent this, borders would have to be sealed tight to control immigration, and a strict system of tamper-resistant identification cards (computerized like credit cards) would be a part of the normal routine. In

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order to protect the future of their own (reduced number of) progeny, the successful states would either need to be uncaring of other's progeny or effectively assist other countries to control their population.

The threat of worldwide Malthusian conditions requires that altruism must be realistic, i.e., it must take the form of "tough love." The problems posed are so difficult to solve, that a "do as I say, not as I do" approach to helping other countries simply would not work.

If the pressure of population within the U.S.A. should rise to dangerous levels, as a result of uncontrolled future immigration by economic refugees reinforced by ghetto welfare children, inherent in any solution that requires force is the modification of the "Bill of Rights" portion of the U.S. Constitution. While the U.S. Constitution is very explicit about individual rights, it seems to ignore the long-term social implications of individual freedom in the demographic sphere. This, of course, is very understandable, because the founding fathers had no inkling of the problems such as those addressed here. While Americans all now enjoy that freedom and would loath to see it restricted, clearly some very basic changes might be needed if the country were to be swamped by the surplus population of the Third World, increasing as it currently is at close to a *billion* every ten years.

There are severe penalties for procrastination. Any society interested in evading the Malthusian state should begin as soon as possible. The longer a society delays, the more difficult getting started will be. This proceeds from the fact that, the more time evolution has to operate, the more demand for children people will develop independent of the sex drive. A society that waited too long might consider taking steps to evolve backwards so as to reduce the pressure for family occasioned by not acting soon enough. As difficult as "holding your own" is, however, trying to breed the population in reverse to reduce the heavy pressure in the Malthusian direction is all but, or perhaps is, impossible. One would need to require those who wanted children to have fewer, and those who wanted none or few to have more children. And while that is pejorative and painful, a further problem is that there is a significant question of how you could decide which families wanted children and which did not. For solutions that allow some degree of choice in family size, and movement in the direction of

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the family's wishes, one need only ask and get answers consonant with the plan. Where one wishes to do a turnabout, truthful answers will be counterproductive, and hence unreliable.

One thing that makes the above picture so grim is that it assumes a very ambitious goal, to avoid the Malthusian condition in perpetuity. A more reasonable goal might be to keep population growth under control for a sufficient time that perhaps future generations, with more experience, can effect a solution. Even if this meant that the Malthusian state was only postponed for two or three hundred years, that in itself is a significant goal and worthy of consideration. Nevertheless, the reader should not underestimate the difficulties in achieving such a limited goal, as the ground rules would have changed only from "almost impossible" to "very, very difficult." The above suggests, however, that the demographers and statesmen need most urgently to devise an effective means to place bounds on the evolutionary threat by way of population control, irrespective of whether popular sentiment is currently for or against. The topic is simply too important to leave to chance.

No solution is yet in sight, and may never be. The best one can say is that the U.S. is blessed with the fact that if it can effectively restrict mass immigration the worst trouble is still down the road. But while there are things the U.S. could do to help, the general public is probably unwilling to assume the responsibility of passing to the next generation a world in anything like the shape it found it. Most people seem inclined to favor the selfish here-and-now interest of those alive at the present time, but if they do make that choice they should do so in full awareness of the consequences for posterity.

The overarching weight most people assign to the here-and-now in the selection of ethical principles at the expense of rights their progeny should enjoy, leads one to question just how ethical even the most belligerently "ethical" really are. Consideration *must* be given to the harsh reality of world demographic trends. Only if this is done can the residents of this or any other country deserve the appellation of an ethical society.

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ESSAYS ON GERMANIC RELIGION

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BOOK REVIEWS

The Burt Affair
Robert B. Joynson
Routledge, 1989
ISBN 0-415-01039-X

This work is addressed to a rather select audience who are interested in what is commonly identified as the nature/nurture controversy and are familiar with the "Burt affair." It should, however, also be of interest to the public at large as a critical examination of the way in which ethics and values sometimes intrude upon our attempts to discover reality. One would have thought that, four hundred years after the persecution of Galileo for opting for a helio-centric solar system, we would have progressed to the point that definitions of reality are accepted as neutral. The assignment of ethical concern to the response one makes to one's vision of reality seems to be more nearly consistent with the scientific method.

For those not familiar with this distinguished British pioneer psychologist, Cyril Burt (later Sir Cyril Burt), Joynson's biographical summary is provided below as quoted from page 1 of Joynson's book:

> Cyril Lodowic Burt was born on 3 March 1883. He died in his eighty-ninth year on 10 October 1971. His life coincided with a period of outstanding interest in the history of psychology. In 1875 psychological enquiry as we know it today did not exist. Psychology was still generally regarded as a branch of philosophy, of little scientific interest and less practical significance. But the last quarter of the nineteenth century saw the beginnings of a concerted attempt to establish this sphere of knowledge as a branch of natural science, which would have both theoretical and practical value; and Burt was a leading figure in Great Britain in this undertaking.
>
> His career was a brilliant microcosm of the major trends

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and influences of the period. In the first decade of the century, as McDougall's first student at Oxford, Burt helped to conduct Galton's anthropological survey of the British population, devising and adapting for this purpose some of the earliest tests of intelligence.

After teaching at Liverpool University, where he worked with the great physiologist Sherrington, Joynson tells us that in 1913 Burt became the first educational psychologist in Britain when he accepted an appointment with the London County Council. Here he pioneered the principles upon which the new profession of educational psychology was to be built. Twenty years later he succeeded to the chair of psychology at University College, London, then the leading position in British psychology. His major theoretical contribution, *The Factors of the Mind* was published in 1940. In 1946 he was knighted, the first psychologist to be so honored; and in 1950, he was elected a Fellow of the British Academy. After retirement, Burt remained a prolific writer and a pungent critic, keeping abreast of current thought but embodying the historic roots of the subject.

It is somewhat difficult to organize my response to *The Burt Affair*, as there are at least three aspects worth covering. First, the book is a defense of Cyril Burt, secondly it is commentary on one of the most shocking cases of scholastic denigration, which was built into international dimensions for directly political reasons, and last but not least it is a fascinating "who done it" that had me glued to the book to discover how Joynson gets Burt out of what seemed to be a non-denumerable set of charges made by his denigrators. In mentioning this last aspect I have said about all there is to say about it. The remainder of this review, therefore, will cover only the first two aspects.

I had further difficulty attempting to decide which of the first two aspects was central. Certainly the defense of Cyril Burt encompassed by far the most pages, but what one has or needs to say also determines space allocation. Because I was never one to believe that one could prove that the earth was flat by either rightly or wrongly accusing a round-earther of fraud, I find myself prejudiced in the direction of believing that only the social commentary aspects justify what must have been a prodigious and detailed task, not all of which, I am certain, was as interesting as

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the account Joynson has given in this book.

I might further reveal my prejudice in stating that I was one of those who had accepted the "guilty" verdict. This was not, however, from choice, but from the realization that researching the issue was an option that I could not afford. I was appalled that, for a time, it seemed to be *de rigueur* to include a chapter devoted to Burt's "malfeasance" in any work bearing on the hereditarian controversy, as if reality were changed thereby.

Although Joynson does not paint Cyril Burt as a paragon of explicitness and order in his empirical studies, it is clear that a significant portion of this, what might charitably be called "informality," was in part inherent in any pioneering effort and in part due to naiveté and self-confidence that he was trusted with "minor" detail. From the descriptions of the data given by Joynson, his papers were clearly not prepared defensively. The only easy and likely thing to check is internal consistency and his papers were replete with at least apparent anomalies. Burt, however, seemed to place infinite trust in his fellow colleagues to "just ask" if there were a problem, not realizing the political significance of this "informal" style for future generations.

The greater part of the alleged fraud takes place during Burt's later years when some accounts allege that his competence and alertness had declined. Others, however, testify to the contrary. A more likely possibility was that Burt's extremely successful career as a young to senior analyst established a set of working standards which he maintained throughout his career. A problem is that standards acceptable during his pioneering days were replaced with more stringent ones with time and in view of the political implications, and rightly so. Burt may simply not have adjusted, a not unlikely outcome for mortals.

Since it is unreasonable to give a full account of all charges and rebuttals in a review, an example will be given of two types of explanation. The first and most numerous, is that the charges were simply wrong or unfounded. The other examples are cases where surviving evidence of Burt's documentation is sufficiently poor or confused that it is possible for his detractors to allege either fraud or incompetence.

In order to understand the incidents, however, some preliminary background is essential. Alan and Ann Clarke were students of Eysenck at Maudsley Hospital, although officially assigned to

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Burt as their thesis advisor, since Eysenck was not formally qualified at that time. The Clarkes became part of the anti-hereditarian school. Two or three years after Burt's death in 1971, when he was no longer available to defend his work, a number of scientists challenged his work, although with no claim of fraud. As the nature/nurture debate became inflamed, charges were levied by Gillie, a medical correspondent to the *Sunday Times*, on 24 October 1976, that data were "cooked" to support the hereditarian position (Gillie, 1976). At that time, Professor Hearnshaw of Liverpool University, who had been no friend of Burt during his life, was in the process of writing a biography of Burt, and there was a general consensus to delay a decision pending Hearnshaw's completion of the biography. Naturally, in the course of this effort, Hearnshaw communicated with various psychologists, including Alan Clarke. Hearnshaw's biography of Burt agreed with the theory of Burt's guilt, ascribing it to Burt's mental condition which may be presumed to have deteriorated with age. These remarks do not constitute a summary, but are only in sufficient detail to identify the participants.

An example of a case where Joynson shows that the charges against Burt were themselves unfounded is given beginning on page 244 (Joynson 1989). According to Joynson, Hearnshaw, in preparing Burt's biography, received a letter from Alan Clarke, a passage from which is given below:

> After the Ph.D. vivas [writes Clarke] Burt said that we were both to glance at some brief summaries he had made of our theses and approve them, because 'I like to publish some of the more promising results.' These summaries proved to be a little inaccurate. We corrected them, and almost forgot about the incident. In the autumn, to our astonishment, we found two articles under our authorship in the *British Journal of Educational Psychology* implicitly attacking Eysenck. We did not recognize them as the same summaries (of which we had no copies) we had corrected at University College. Our theses had indeed been critical of the 'dimension of personality' approach [i.e., the approach favored by Eysenck] – but on the whole the emphasis of 'our' articles was slanted. We went personally to Eysenck to apologize, who, hearing our disclaimer, was exceedingly generous, saying that this sort of play was typical of the old

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> man. When I asked him for advice, he suggested that I should let the matter drop. Nevertheless I wrote an angry letter to Burt, and was told that he thought we were out of the country and hadn't therefore sent galley proofs. By this stage we had become quite clear that Burt was dishonest, and predictably he later quoted 'our' two articles as independent support for his attack on Eysenck."

It turns out that neither Clarke's nor Burt's originals were available for reference. Joynson, however, was able to compare the two thesis contents with the reference articles. The papers were in fact not articles, but included in "Summaries of research theses," a section appearing routinely in the journal. According to Joynson, a comparison of the summaries with the thesis contents shows that the summaries are rational and balanced accounts, and indeed, if anything, less slanted than the theses were against Eysenck. Burt was the formal supervisor of the work in question, and, according to custom, had the privilege of editing publications, and indeed, assuming the role of senior author if he so desired. While the evidence shows that the events were not as the Clarkes had charged, it may be admitted that the balance between authors' and editors' rights is difficult, but even in this respect there is scarcely a sufficiently convincing case of editorial interference as to justify a cry of outrage twenty-six years after the incident.

An example of the problems with Burt's informal documentation relates to a case where, by implication, new data were provided, yet the calculated correlations were so close to previous published data in a sufficient number of table entries as to make chance an exceedingly implausible explanation. This problem is easily noticed, but for some reason Burt had not been challenged at the time, or at any rate no record of any challenge was found. It may simply be that, given Burt's status and the fact that his own comments in the text indicated that the data were not of the best, that the data were not challenged as the author had already discounted it. Because it was so obvious and visible, however, in the storm of the controversy it could not help but be a point of attack.

Joynson first lists, identifies and discusses many cases of repeated correlations where presumably change would be expected as new data were "included." This problem was pandemic in Burt's

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work, and cannot be easily summarized in a review. This problem is very convoluted, and Joynson selects as a proof case three particular publications for analysis which not only contain a profusion of repeated correlations, but the last of which explicitly indicates the addition of new data. An essential part of the problem was that the number of subjects for each category was not explicitly stated. Thus it was impossible to tell whether the entries were for the same number of subjects as in the previous papers, (Burt 1955) and (Conway 1958), or whether the coefficients had been calculated after the inclusion of new data, which was the purpose of Burt's article (Burt 1966). Although this is one of the most difficult problems to explain in terms complimentary to Burt, Joynson makes the following points:

1. No one has advanced a motive or purpose for such a transparent anomaly. If deceit had been the purpose, it would surely not have been done such as to be so baldly apparent.

2. The fault occurs in all types of table entries, those germane to the argument and "off-line" entries as well. In fact, the multiple entries occur less frequently for the entries which bear on the hereditarian issue.

3. In the period between the tables, the data had been dispersed and some of it destroyed as a result of the war. Some of the identical entries may have been so because, as a result of loss or confusion, there was no additional data.

4. The text does generally indicate that there are problems with the data, suggesting that some of it may have been rejected. This is not to say that, under the circumstances, more complete documentation should not have been provided.

For such reasons, it is hard to maintain a "beyond reasonable doubt" conclusion of fraud, although clearly the study results are now of no more than historical interest, given the faults in the documentation and the more recent better-documented data.

The above two examples are, of course, most inadequately sketched, as Joynson provides blow by blow and step by step detail. Also, the two subjects here much abridged represent only one fiftieth of the total. Thus it can be seen that the subject was covered in copious detail.

Joynson proceeds from an analysis and ultimately a defense of Burt, to describe how it came to pass, and to suggest reasons for the "Burt affair." One of the significant reasons, according to

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Joynson, is that the "science" of psychology had broken into schools, each with its cadre of adherents and advocates, each claiming that their model was the model of choice. This creates a very competitive and in time combative climate in which to work. Although the lines are not necessarily rigid, Joynson identifies four such schools: Behaviorism, Gestalt, Psychoanalysis, and Factor Analysis. A further contribution comes from the fact that the subject is neither politically, religiously, nor socially neutral. With respect to the nature/nurture controversy, some believe that reality is primary, and the ethical and/or religious task is to determine the optimum human response to that reality. Others believe that ethical and religious consideration comes first, and that one's definition of reality needs to be consistent with that ethical and/or religious view of the world. Clearly there is little common ground upon which to find compromise.

Joynson tries very hard to give equal time and consideration to both schools of thought. In his vindication of Burt, at least to the point of saying that there is no compelling argument supporting charges of fraud, Burt could be said to be supporting the hereditarian position, although he scrupulously does not say so. His position is that subsequent data bearing on that subject is both overwhelmingly superior in scholarship and quantity and consistent with Burt's data, thus implying that the question is moot from the standpoint of science.

Many believe that reading a book review substitutes quite well for the real thing. In the case of Joynson's effort here this is definitely not the case. The depth of detail and scholarship has an impact that it is impossible to replicate in a book review. Read it.

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The Great Sex Divide
Glenn Wilson
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Glenn Wilson, Senior Lecturer in Psychology at the Institute of Psychiatry, University of London, has here produced a survey of male-female differences which is not only entertaining reading, but also provides non-specialists with an invaluable summary of the result of psychological research in the study of contrasting male/female personalities.

It is frequently claimed that men and women are basically the same, apart from their reproductive roles, any perceptible differences being due to social conditions. According to this theory, boys are taught to suppress tears and to engage in rough, competitive activities, while girls are encouraged to play with dolls and to develop personal relationships and domestic skills. So-called 'masculine' and 'feminine' behavior patterns are seen as programmed into human beings from an early age.

Glenn Wilson examines this hypothesis in the light of scientific evidence from human biology, anthropological studies and the animal world. He argues persuasively that it is essential to recognize male and female psychological differences in addition to the obvious physical disparities and that an acknowledgement of their existence does not undermine their right to equality before the law; rather that it can help men and women fulfill themselves and promote understanding between the sexes.

The book is written with a sense of humor. Its very first paragraph begins:" A certain professor once dreamed he had discovered the secret of the universe. Waking momentarily, he jotted it down on his bedside pad and resumed his slumber. In the

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morning he remembered the experience and excitedly snatched his pad to see what it said. It read: 'Higgamus hoggamus, women are monogamous; hoggamus higgamus, men are polygamous.' The professor was greatly disappointed, for while he thought it was probably true, he doubted that it was any secret, let alone the 'secret of the universe'."

In his text, author Wilson attempts to answer the questions: what is the nature and extent of the difference between men and women? If the difference exists, what is its origin or cause? How easily could the difference be dismantled, if this were agreed upon as a desirable end?

His answer will be a major disappointment for hardened feminists. In general, he accepts sociobiological or evolutionary explanations of the basic patterns of human behavior, or at least in so far as the differences between male and female behavior are concerned. His explanations of measurable and identifiable major gender differences are quite explicable in the manner he indicates – as deriving from different evolutionary roles fulfilled by the sexes. Men have greater size and strength than women, and also a capacity for short-term energy output, whereas women have a superior capacity for endurance. Men have better mathematical and spatial skills, and a better aptitude for logical reasoning. Women easily develop verbal and social skills, and a stronger sense of empathy.

Men are temperamentally inclined toward dominance; women to submission. Men are aggressive in a rank-related manner, female aggression is generally only defensive. Men seek to be independent, women seek attachment. Men are sensation-seeking while women are security-seeking.

Efforts to locate the brain areas associated with male and female behavior indicate the importance of that area of the midbrain called the hypothalamus. This is about twice as large in males as in females.

This does not stop Wilson from asking whether these differences need continue to dominate modern human society, and whether it is possible to reshape male-female roles by cultural engineering. What he concludes, however, is that attempt to eliminate sex role differences in our society therefore automatically works against our natural propensities, and can therefore cause psychic tension and grief. It would mean that we had to encourage submissiveness in

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men and punish submissiveness in women. Biological variables are far deeply rooted than any social variables in determining male and female behavior. Adverse cultural pressures not in tune with biological reality can cause psychological stress.

Finding activist feminists at fault, therefore, Glenn Wilson quotes from one of Betty Friedan's own books, *The Second Stage* where she admits that feminism has replaced old dissatisfactions with a new set of problems for women – problems which Wilson says are caused by attempting to go against gender-based psychological realities.

This is a well-written and comprehensive survey of a much debated subject, which is to be commended for its simple but realistic approach to the subject. It is balanced scientifically but at the same time is so attractively and entertainingly written that it deserves to be in both university and public libraries. As it is available in paperback format without doubt it will find its way into many private libraries as well.

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The Great Sex Divide

Glenn Wilson

Institute of Psychiatry, University of London

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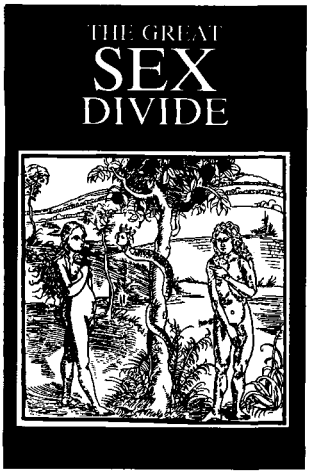

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